OPA

1632

Draft Scope of Work (SOW) Phase II
Enhance Soil Vapor Extraction
for
Rapid Response Action (D.O.# 88 ITC)
Naples Truck Stop - Gasoline Spill
Vernal, Utah
13 July 1994

CONFIDENTIAL

1. Introduction. The U. S. Environmental Protection Agency (USEPA) and the U. S. Coast Guard have requested that the U. S. Army Corps of Engineers, Omaha District, perform an initial investigation and subsequent time-critical removal action at this site as a result of an unleaded-gasoline release. The release was a result of a ruptured fuel line from an above ground gasoline storage tank. The spilled fuel is now endangering a residential water main, storm sewer, and a tributary waterway (unnamed) of the Green River. The USEPA has requested that an Immediate Response be implemented to stabilize the spill and to begin temporary extraction and treatment with long-term operations and maintenance support.

2. Purpose. The purpose of this scope is to outline the general and any additional requirements that the Contractor will need to perform to successfully complete this project. The Contractor shall provide all labor, equipment, materials, training, transportation, and disposal necessary to accomplish specified tasks.

3. Site Visit and Scope Clarification. This Scope of Work shall address any work which has been conducted under the undefinitized contracting action or work which will be accomplished prior to the delivery order award. Based on discussions and agreements at the Scope Clarification meeting held on 04 May 1994, at the Questar Pipeline facility, the Contractor shall implement the additional construction and system components to ensure recovery and to prevent any further plume migration. The contractor shall reference the Meeting Minutes (Appendix B) and this Scope of Work for further clarification on tasks to be performed.

4. Site Location. The Naples Gasoline Spill Site is located in Naples, Utah, between 1500 South and 1700 South Streets and 1500 East (Highway 40) and 1700 East Streets; Section 31, Township 4S, Range 22E, Uintah County. The actual point of recovery and treatment is located on the Questar Pipeline Company property which is southeast of Naples Truck Stop at 1571 East 1700 South Street.

5. Site History and Background. Questar Pipeline Company reported a suspected underground storage tank release on 01 November, 1993 after a product alarm sensor detected a release of petroleum hydrocarbons in an adjacent monitoring well. After a thorough investigation by Questar and its contractor, it was determined that the origin of the release was possibly an aboveground storage

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tank located at Naples Truck Stop. Questar Pipeline then petitioned the State of Utah, Division of Response and Remediation to redirect the responsibility to the Potential Responsible Party (PRP) for the remediation of the plume. Due to the extent of the plume and the possible threat to the health and safety of the Questar employees and nearby residents, efforts were undertaken by Questar Corporation to install a cutoff trench at the leading edge of the gasoline plume. With the need for a time-critical removal action and the lack of hydrogeologic data on the surrounding area it was agreed upon by all parties involved that this approach would provide the best recovery and would most likely prevent the contaminant plume from entering into the tributary waterway and residential areas. All remediation work at this time was contracted for and directed by Questar Corporation. Once existing hydrogeologic data was gathered from local agencies and analyzed, the trench intercept construction was halted and all on-site operations relating to the contaminant plume were assumed and directed by USEPA Region VIII.

USEPA Region VIII engaged the services of the US Army Corps of Engineers, Omaha District (CEMRO), to execute an Immediate Response removal action to stabilize and begin extraction and treatment of the contaminant plume with long term operations and maintenance.

6. Site Work. The Contractor shall identify and strictly adhere to all legally Applicable or Relevant and Appropriate Requirements (ARAR's) for this project. The site work (will) was divided into two separate phases to accomplish the overall work effort. The following are a description of the phased approach;

Phase I - All work which was accomplished prior to the actual delivery order award. This work effort shall be tasked as per direction given in the "Revised Scope of Work Phase I" dated 16 March 1994.

Phase II - All work which has been defined and negotiated prior to the actual implementation and can be scheduled and/or revised to accommodate personnel and equipment shortages.

7. Description of Project. Phase I of the project consisted of the following actions: aquifer investigation and continuous pump test to determine the hydraulic characteristics of the aquifer, pilot study to determine the feasibility of biological treatment of the contaminated groundwater plume (which was a continuation of a Questar treatment method), backfilling of the intercept trench, asphalt patching to the existing surface area, survey the existing monitoring wells and key points on the spill site, installation of six (6) extraction/monitoring wells, temporary storage of contaminated groundwater, installation of electrical service for phase I/II extraction pumps, construction of a base concrete slab to provide as a mounting platform for the pumps and treatment system, installation of one (1) - fifteen (15) gpm extraction pump and miscellaneous tasks which were necessary to enable the system to effectively operate.

Phase II of this project shall consist of the following actions: installation of down gradient monitoring extraction wells, installation of extraction wells at the product plume head (these wells will be utilized to remove the free product from under Naples Truck Stop), installation of vapor monitoring points which will be used in monitoring the system performance, installation of one (1) - fifteen (15) gpm extraction pump which will operate the second sector of extraction wells, construction of a building which will house the extraction pumps and motors, characterization of an existing contaminant spill on the Naples Truck Stop property (data is required to ascertain whether or not the contaminant is migrating with the spill of concern, and if so, will the contaminants ultimately affect the biological treatment cell or the extraction system), preparation and implementation of an operations and maintenance program which will include a written standard operating procedures guide to be implemented and enable the operator to achieve the optimum system performance, and miscellaneous tasks which will be required for system performance.

8. Tasks. The Contractor shall develop the plans, cost proposal, and perform the work based on the following tasks:

8.1 Project Work Plan Development. The Contractor shall prepare the project work plan. Portions of the plan are discussed below. Refer to paragraph: "Revisions and Addenda " for details on how to revise the project plan. This plan shall include a detailed discussion of the technical approach of the Contractors plans to implement the requirements specified herein and in accordance with other contract documents. The plan must be reviewed and approved by the Contracting Officer prior to the commencement of the work. The Contractor shall prepare the following sections to the project work plans.

8.1.1 Work Plan (WP). The WP shall discuss specific tasks outlined in this scope of work. A schedule shall be developed that presents the length of the individual tasks, interrelationships between tasks and other key milestones. The WP shall discuss permits, licenses, and certificates and state name, identification number, and location of the disposal facilities, if necessary. The work plan shall contain a section outlining key personnel to be used on the project and their responsibilities.

8.1.2 Site Safety and Health Plan (SSHP). Specific guidance for preparation of the SSHP is presented in Appendix D. Health & Safety Instructions.

8.1.3 Site Specific Advance Agreements (SSAA). The Contractor may submit proposed SSAA with the Cost Proposal. Following negotiations the approved SSAA will be attached to this scope of work in Appendix E.

8.1.4 Chemical Sampling and Analysis Plan (CSAP). The Contractor shall follow the requirements specified in Appendix C, "Chemistry Instructions"

8.1.5 Cost Proposal. The Contractor shall submit the cost proposal by 22 July, 1994. The Contractor shall not be reimbursed for expenditures incurred during the Cost Proposal or Site-Specific Advance Agreements preparation and negotiation with the exeption of costs which were incurred during phase I of this project and are in accordance with Advanced agreement # 21. The Delivery Order Cost Proposal shall be prepared as Phase I and Phase II work tasks based on this Scope of Work and previously issued Scope of Work for the Phase I Immediate Response. THE CONTRACTOR SHALL SUBMIT TWO-(2) COPIES OF THE PHASE I COST DATA AS SUPPORT DOCUMENTATION TO THE LINE ITEM COSTS FOR THIS PHASE. The Cost Proposal shall provide a time-phased breakdown for each "TASK" based on Direct Costs including labor, equipment, materials, subcontracts, and indirect costs including overhead and G&A expenses.

The Contractor shall provide sufficient cost and pricing data in the Cost Proposal, including catalog prices or/and market prices. At a minimum for subcontracts greater than $10,000, the Contractor shall provide three independent quotes and justification of selection. The Contractor shall provide estimated production rates of equipment. The Cost Proposal shall be submitted as specified in paragraph: "Cost Proposal" to CEMRO-CT-H/Witcofski (See Table 1).

8.2 Phase I. The Contractor shall specify the equipment, personnel, per diems, material, and subcontracts required to complete all tasks associated with Phase I activities.

8.3 Phase II, Plans & Project Preparation. The Contractor shall specify the equipment, personnel, and material to complete the tasks as specified in this scope of work. All plans shall be real-time, based on a realistic schedule to complete the scoping tasks.

8.4 Mobilization/Demobilization. The Contractor shall specify the equipment, personnel, material, and their respective location from which mobilization will occur and anticipated travel time.

8.5 Site Preparation. The Contractor shall specify the equipment, personnel, and material to complete the tasks as specified in this Scope of Work. The Contractor shall obtain all necessary permits and licenses connected with this project. The Contractor shall be responsible for maintaining offices and utilities that were procured during Phase I which are necessary for the continuation of this project. The contractor shall specify the materials to be used in the construction of temporary equipment storage sheds, decontamination pads and temporary storage pads and their respective locations in the workplans. All staging and construction shall have Questar approval prior to implementation.

8.6 Monitoring/Extraction Well Installation. The Contractor shall install flush mount wells which can be utilized either for purposes of extraction or monitoring. The contractor shall reference Appendix F "Geology Instructions" for specific guidance on quantity and installation procedures.

8.7 Vadose Monitoring Points. The Contractor Shall reference Appendix F "Geology Instructions" for specific Guidance on installation. The Contractor shall specify specific locations within the plume area for performance monitoring of the plume area.

8.8 Pump House and Storage Building. The Contractor shall construct a temporary structure based on the following factors: (1) most economical materials; (2) materials which are readily available; (3) complies with Questars existing buildings; (4) subcontractor shall have the capability to perform engineering/design; (5) meets local building codes. The Contractor shall submit all drawings and diagrams to the COE for Final approval prior to building construction. This structure is to house all treatment system components and shall be winterized to prevent damage to the system in its entirety. Based on the space which is available, forty (40) feet by sixteen (16) feet, the Contractor shall consider this for the slabbed foundation. The building shall also provide for a limited maintenance area with office space. **All temporary buildings shall meet the local building codes, permit requirem and shall have USACE approval prior to siting.** Proposed locations for siting shall be indicated on the site layout map.

** All temporary buildings shall have a fixed fire suppression system installed prior to operation**

8.9 Per diem & Lodging. The Contractor shall specify the equipment, personnel, and material to complete this tasks as specified in this scope of work.

8.10 Characterization of Naples North East Corner. The Contractor shall reference Appendix C "Chemistry Instructions" for specific guidance on characterization parameters.

8.11 Operation and Maintenance (O&M). The Contractor shall reference Appendix G "Operation and Maintenance" for guidance on preparing the O&M manual. The Contractor will be required to operate the extraction and treatment system in its entirety for a minimum of Ninety-(90) days upon successful completion of a trial and shakedown period. During this time the contractor will refine the Operation and Maintenance guidance which will then be incorporated in the final O&M manual. The Contractor shall provide training during this period to the selected service contractor for the long term O&M.

8.12 Miscellaneous Tasks. The Contractor shall, at the discretion of the COR, provide works as required during routine daily tasks such as waterline replacement, sewer connects, transportation and disposal of drummed wastes.

8.13 Site Indirect. The Contractor shall specify the equipment, personnel, and material to complete this tasks as specified in this scope of work.

8.14 Project Support. The Contractor shall specify the equipment, personnel, and material to complete this tasks as specified in this scope of

work. This task shall include all costs which are not task specific.

8.15 Final Project Report. The Contractor shall submit a Draft Final Report within 60 days of the completion of on site work for this delivery order. Requirements are specified in paragraph 6. Submittals.

9.0 Draft Project Work Plans. Submit the following documents by 22 July 1994 to the USACE-TM. All work plans shall be submitted as one document.

9.1 Draft Site Safety and Health Plan (SSHP).

9.2 Draft Work Plan (WP) and Personnel Resumes.

9.3 Cost Proposal.

9.4 Site-Specific Advanced Agreements (SSAA).

10.0 Final Project Work Plans. Upon conclusion of negotiations, the Contractor shall submit the Final Project Work Plans which shall incorporate all the above work plans, review comments, and corrections from the negotiation within 5 days upon conclusion of negotiations, or as otherwise determined during negotiations. Procedures for revisions are discussed in paragraph, "REVISIONS AND ADDENDA."

10.1 Daily Submittals. One copy of daily submittals shall be submitted to the USACE on-site representative at the close of business, daily. All daily submittals shall be available for electronic transmittal to the Omaha District Offices at the close of business, daily. Daily submittals include:

10.1.1 Rapid Response Daily Work Order.

10.1.2 Rapid Response Quality Control Daily Report. This form is provided in Appendix H - Project Forms.

10.2 Weekly Status Report. The Contractor shall submit a Weekly Status Report no later than 7:00 a.m. Central Standard Time, the following Monday after the week being reported, to the locations specified in Table 1. The Weekly Status Report shall be transmitted weekly from delivery order initiation until demobilization occurs. At this time, the report shall be transmitted bi-weekly until Final Payment is made. This report shall be transmitted via telefax.

10.2.1 Weekly Status Report format is as follows.

10.2.1.1 Project Name.

10.2.1.2 Date of Report.

10.2.1.3 Name, Title, Telephone number, Address, Company Name of Person Completing Report and Telefax number.

10.2.1.4 Summary of Work Performed, On-Site and Off-Site.

10.2.1.5 Deviation from Scope of Work and Workplan (including mods. and schedule slippages).

10.2.1.6 Problems encountered.

10.2.1.7 Recommendations.

10.2.1.8 Key personnel changes.

10.2.1.9 Work anticipated to be performed next week.

10.2.1.10 Percent field work complete.

10.2.1.11 Project percent complete.

10.2.1.12 Tabulation, with breakout by wastestreams, of hazardous wastes/substances and special containerized, sampled, and transported for the week and also to date.

10.2.1.13 Submittal of Hazardous Waste Manifests, Waste Profile Sheets, and Land Disposal Restriction forms that were signed and transmitted to laboratories, disposal facilities or transporters during the week.

10.2.1.14 Records of conversations with Regulatory Agencies, public, news media, property owner and other significant individuals.

10.2.1.15 Weekly cost summary, which includes a breakdown of daily and weekly expenditures, as well as a total of expenditures to date (Cost-reimbursable delivery orders only).

10.3 Hazardous Waste Manifest Annual and Biennial Reporting Requirements. The Contractor shall determine and comply with all of the following items for Hazardous Waste Manifests Report Requirements. Specific Contractor requirements include, but are not limited to:

10.3.1 Determine the amount of waste generated at the site per month during performance of this delivery order.

10.3.2 Determine the generators' status at the site based on Federal and State regulations. Generator status may include: conditionally-exempted small quantity generator; small quantity generator; and generator.

10.3.3 Determine state reporting requirements and obtain current state reporting forms.

10.4 Preparation, Submittal and Approval of Hazardous Waste Manifests, Waste Profile Sheets and Land Disposal Restriction Notification and Certification.

10.4.1 Preparation. The contractor shall have a single Contractor Regulatory Specialist (CRS) review all hazardous waste manifests, waste profile sheets and land disposal restriction notifications and certifications before these documents are submitted to the Omaha District for approval. The regulatory specialist qualification shall be described in a resume which shall be submitted for approval in the Site-Specific Advance Agreements.

10.4.2 Submittal. The Contractor Regulatory Specialist shall certify as correct, the Hazardous Waste Manifest (HWM), Waste Profile Sheets (WPS), and Land Disposal Restriction Notifications and Certifications (LDRNC). The Contractor Regulatory Specialist shall submit to the Omaha District Regulatory Specialist for approval, the HWM, WPS, LDRNC and all other supporting documentation as a complete package for each particular waste stream as specified in Table 1 and by overnight mail delivery service. Supporting documentation shall include waste disposal history, all analytical results, and material safety data sheets available, and any other information received in identifying the proper waste code.

10.4.2.1 Prior to the submittal package, a one page evaluation and decision logic justification of each waste code determination shall be presented to the Omaha District Regulatory Specialist as specified in Table 1.

10.4.3 Approval. The Contractor shall not transport or ship any wastes until he receives approval of the Hazardous Waste Manifest, Waste Profile Sheets and Land Disposal Restriction Notifications and Certifications from the Omaha District Regulatory Specialist. The approval process shall take three working days after the Omaha District Regulatory Specialist receives the documents. After the approval process is completed, the Omaha District Regulatory Specialist shall telefax to the Contractor Regulatory Specialist the decision from the approval process. The HWM, WPS, LPRNC, and certifications shall be listed on engineering form 4025. The contractor regulatory specialist shall sign the "name and signature of contractor" block prior to transmittal to the Omaha District.

10.4.4 Designation of Generator. The generator and signer of Hazardous Waste Manifests, Waste Profile Sheets and Land Disposal Restriction Notifications and Certifications shall be identified by the US Army Corps of Engineer's On-Site Representative during the preconstruction conference.

10.4.5 Hazardous Waste Manifest Tracking and Exception Reporting. The Contractor Regulatory Specialist shall track all Hazardous Waste Manifests in accordance with 40 CFR 262.42 and maintain a record and perform the following:

10.4.5.1 The date that the transporter accepts the waste by his signature on the manifest shall be designated as Day 1.

10.4.5.2 Track the manifest and its associated waste to determine its current location.

10.4.5.3 Determine if the generator has received a copy of the manifest from the Treatment, Storage and Disposal Facility (TSDF) on or before Day 35. If not, then the Contractor shall contact the transporter and TSDF immediately to determine the status of the waste. The Contractor shall immediately report any discrepancy to the Fort Crook Area Office as specified in Table 1.

10.4.5.4 The Contractor shall prepare an exception report, if the generator has not received a copy of the manifest from the TSDF by Day 44. The exception report shall be submitted to the Fort Crook Area Office as specified in Table 1, no later than Day 45.

10.4.5.5 In instances where characteristic wastes are treated and destined for a Subtitle D facility, the contractor shall monitor the TSDF and document that the appropriate notification and certification requirements under 40 CFR 268.9 have been completed. This information shall be presented in the final report.

10.5 Toxic Substance Control Act PCB Reporting Requirements. If specified in this Scope of Work or in the event of discovery of equipment or containers containing PCB-contaminated fluid and items marked, "Property of the US Government," or equivalent marking, the Contractor shall:

10.5.1 Notify the U.S. Army Corps of Engineers' On-Site Representative immediately and report the findings in the daily and weekly report.

10.5.2 Develop all necessary logs and reports in accordance with 40 CFR 761.180. The report shall include all PCB-contaminated equipment or containers and items that are marked, "Property of the U.S. Government," or equivalent marking.

10.5.3 Complete and submit all necessary information to complete the annual records and annual documentation log of the deposition of PCB's and PCB items to the Omaha District Regulatory Specialist as specified in Table 1 and in the Final Project Report specified in paragraph 7.6, Final Project Report.

10.6 Final Project Report. Draft and Final copies of the Project Report shall be submitted. While all submittals should be error-free, an extra effort shall be made to provide an error-free Final Project Report. The Draft Project Report shall be submitted by 60 days following completion of

on-site activities. The Project Report shall include (if applicable) but not limited to:

10.6.1 Summary of Work Performed. Summary of work performed including, but not limited to:

10.6.1.1 Narrative of the Scope of Work (including project objectives, mobilization and demobilization, site setup, site operations);

10.6.1.2 Safety;

10.6.1.3 Quality control;

10.6.1.4 Recommendation, lessons learned;

10.6.1.5 Conclusions;

10.6.1.6 Any other unique or special tasks performed or situations documented.

10.6.2 Supporting Data. The tabulation of criteria, data, circulations, etc., which are performed but not included in detail in the report shall be assembled as appendices. Criteria information provided by the Omaha District need not be reiterated, although it should be referenced as appropriate. The Appendices shall include but not be limited to:

10.6.2.1 The final Scope of Work.

10.6.2.2 Completed permits and verbal conversation records concerning any permitting.

10.6.2.3 Licenses.

10.6.2.4 Hazardous Waste Manifests, Waste Profile Sheet, shipping documents, Land Disposal Restrictions certification and notification, Federal and State Annual and Biennial Reports, TSCA Annual Reports, Certificate of Disposal for PCBs and Exception Reports.

10.6.2.5 OMIT.

10.6.2.6 Rapid Response Quality Control Daily Report.

10.6.2.7 Weekly Status Report.

10.6.2.8 Sampling and Analysis Documentation and Results.

10.6.2.9 Chain-of-Custody Records.

10.6.2.10 Photo Documentation.

10.6.2.11 Cost data, if cost reimbursable.

10.6.2.12 List of visitors.

10.6.2.13 Project Points of Contact address and phone (including Site Manager, T&D Contractors, Subcontractor names, USACE-TM, Ft. Crook personnel, etc.)

10.6.2.14 Survey reports and backup notes. As built drawings, sketches and/or other information which clearly represent the site conditions after implementation of the Delivery Order.

10.6.2.15 Relevant Conversation Records especially ones that either impact the Scope of Work, Cost Proposal, or Final Report.

10.7 Partial Submittals. Partial submittals will not be accepted unless prior approval is given.

10.8 Cover Letters. A cover letter should accompany each document and indicate the project, project phase, the date comments are due, to whom comments are to be submitted, the date and location of the review conference, etc., as appropriate. (Note that, depending on the recipient, not all letters will contain the same information.) The contents of the cover letters should be coordinated with the USACE-TM prior to the submittal date. The cover letter shall not be bound into the document.

10.9 Covers. The report covers shall be durable binders which hold pages firmly while allowing easy removal, addition, or deletion of pages. A report title page shall identify the report title, the Corps of Engineers and the date.

11.0 Revisions and Addenda. Review comments issued prior to Government approval shall be incorporated by revising and reissuing affected pages. If major revisions are necessary, the entire Plan shall be resubmitted. Minor changes affecting only a few pages may be made by addenda sheets. The affected pages shall have the revision number and date of correction on the bottom-right corner of the page. Any changes to the project work plan shall be accompanied by a cover sheet with a list of pages that have been revised. The revised pages that the Contractor issues shall cover any additions or changes to the plans or reports. The addendum for the project plan shall be issued prior to the commencement of work for that phase.

12.0 Project Management. The Contractor shall assign an employee who will serve as the Project Manager (PM). This individual will oversee the coordination of the entire project, administer all instructions from the USACE-PM and obtain answers to all questions from the USACE-TM during and after the work.

13.0 Security. The Contractor shall maintain and secure the site during

all site operations.

14.0 Review of Progress and Technical Adequacy. At any appropriate time, representatives of the Contracting Officer (CO) may review the progress and technical adequacy of the Contractor's work. Such review shall not relieve the Contractor from performing all contract requirements, except as may be waived by written instructions. The Contractor, under this contract, will interpose no objection nor restriction to the Contracting Officer's designation of a Contractor for the purpose of reviewing the adequacy and corrections of the work performed under this contract.

15.0 Conference Notes, Annotated Comments, and Confirmation Notices.

15.1 Conference Notes. The Contractor shall be responsible for taking notes and preparing the reports of all conferences, if required. Conference notes shall be prepared in typed form and the original furnished this office (within seven (7) work days after date of conference) for concurrence and distribution to all attendees. This report shall include the following items as a minimum.

15.1.1 The date and place the conference was held with a list of attendees. The roster of attendees shall include name, organization, and telephone number.

15.1.2 Comments made during the conference, decisions affecting criteria changes, must be recorded in the basic conference notes. Any augmentation of written comments should be documented by the conference notes.

15.2 Annotated Comments. Written comments presented by the reviewers of the project work plans, project reports,conferences, etc. shall be attached to each final submittal with the action noted. Annotated comment action shall be "A" for an Approved comment, "D" for a Disapproved comment, "W" for a comment that has been Withdrawn, and "E" for a comment that has an Exception noted. In addition, brief written responses to comments shall be added where appropriate.

16.0 Applicable Publications. Work performed shall be consistent with this SOS and with the following guidelines and references and in compliance with all applicable regulations and standards including, but not limited to, those listed below. In the case that these requirements are conflicting, the one which offers the greatest protection shall be followed.

16.1 U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1. Issued April 1987, Revised October 1992.

17.0 Attached Requirements. All field, laboratory, and reporting requirements associated with this delivery order shall be completed in accordance with the appendices listed below. If conflicts in specifications or methodology exist between the attached requirements, the Contractor shall

immediately notify the USACE-PM for clarification. Conflicts between this SOS and those desired by the Contractor shall be brought to the attention of the USACE-TM for clarification and approval.

17.1 Health and Safety Instructions. Appendix D is the "Health and Safety Instructions" applicable to this project.

17.2 Forms. Included in Appendix H are the forms required for this project.

18.0 Schedule.

First Proposal Due	July 22, 1994
Begin On-Site Work	TO BE DETERMINED
Complete On-Site Work	(Date to be completed by the Contractor)
Final Report Due	(Date to be completed by the Contractor

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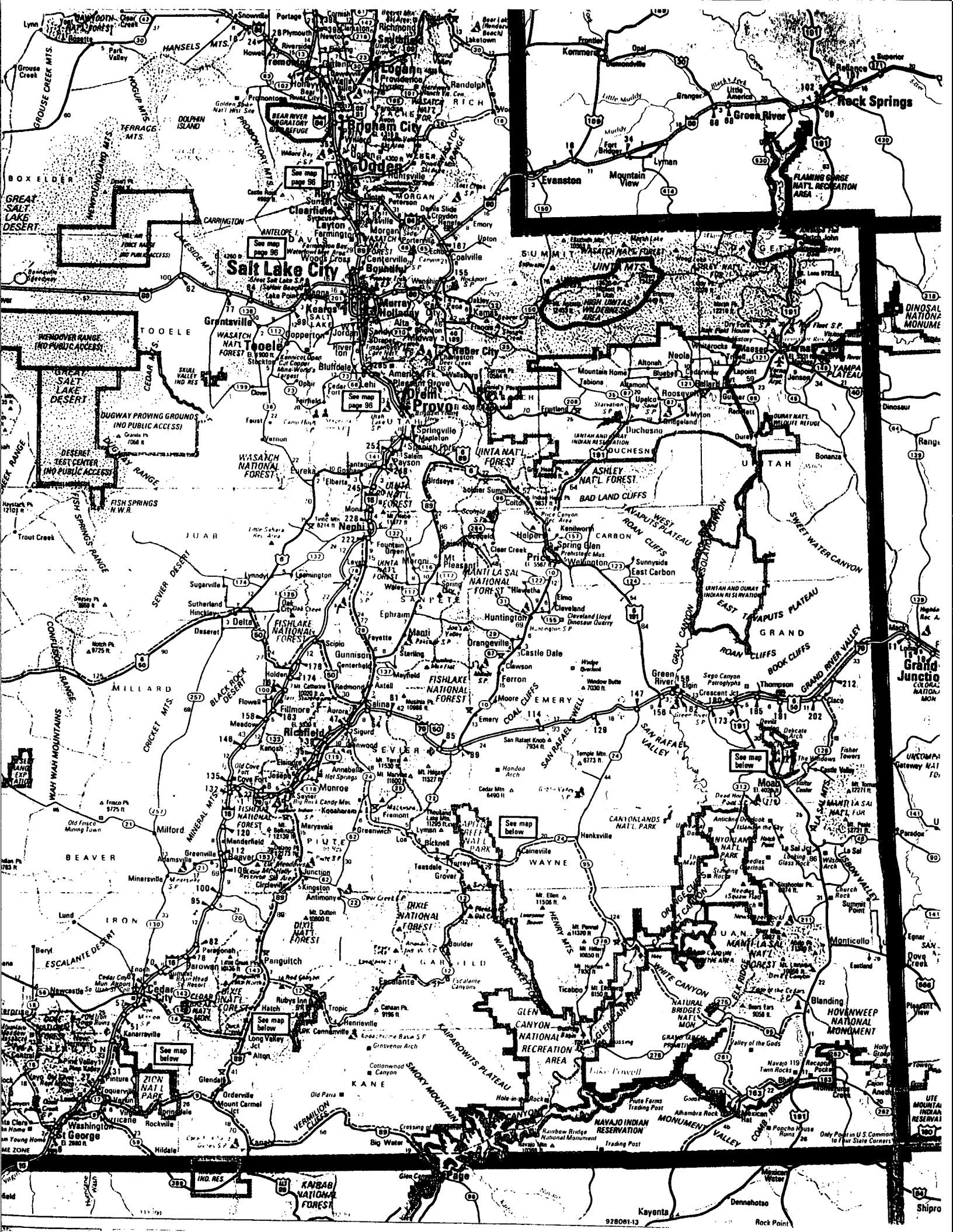
APPENDIX A
SITE LOCATION MAPS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Bountiful
Centerville
Woods Cross
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Holladay
Sandy
Midvale
Kearns
Taylorsville
West Jordan
West Valley City
Magna
Tooele
Grantsville
Stockton
Bluffdale
American Fk.
Pleasant Grove
Lehi
Orem
Springville
Spanish Fork
Payson
Salem
Santaquin
Eureka
Nephi
Fillmore
Richfield
Monroe
Salina
Gunnison
Manti
Ephraim
Mt Pleasant
Fairview
Huntington
Castle Dale
Orangeville
Price
Helper
Wellington
Spring Glen
Sunnyside
East Carbon
Green River
Thompson
Cisco
Moab
Monticello
Blanding
Hanksville
Bicknell
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Cedar City
Kanarraville
Enoch
Beryl
Newcastle
Hatch
Tropic
Henrieville
Canaan Pk.
Long Valley Jct
Alton
Glendale
Orderville
Mount Carmel Jct
Kanab
Fredonia
Hildale
Colorado City
Hurricane
Rockville
Springdale
Virgin
Toquerville
Pintura
Leeds
St George
Ivins
Santa Clara
Washington
Hurricane
Dixie Downs
Dixie Regional Airport
Cedar City Municipal Airport
Parowan Base & Meadows Resort
Cedar Canyon Mun Airport
Kanarra Creek Mun Airport
Escalante Canyons
Canaan Pk. 9196 ft.
Mt. Dutton 10800 ft.
Mt. Ellen 11506 ft.
Mt. Pennel 11320 ft.
Mt. Hillers 10850 ft.
Mt. Holmes 11300 ft.
Mt. Ellsworth 8150 ft.
Ticaboo
Hole-in-the-Rock
Rainbow Bridge National Monument
Navajo Mtn
Lake Powell
Glen Canyon
Page
Big Water
Lake Powell
Kayenta
Dennehotso
Rock Point
Shiprock
Mexican Water
Rock Springs
Green River
Evanston
Mountain View
Lyman
Fort Bridger
Kemmerer
Opal
Diamondville
Frontier
Granger
Little America
Reliance
Superior
Flaming Gorge Natl. Recreation Area
Uinta Mts.
High Uintas Wilderness Area
Wasatch Natl. Forest
Ashley Natl. Forest
Uinta Natl. Forest
Manti La Sal Natl. Forest
Fishlake National Forest
Dixie National Forest
Kaibab National Forest
Glen Canyon National Recreation Area
Canyonlands Natl. Park
Arches Natl. Park
Natural Bridges Natl. Monument
Hovenweep National Monument
Navajo Indian Reservation
Uintah and Ouray Indian Reservation
Skull Valley Ind. Res.
Kaibab Ind. Res.
Dugway Proving Grounds (No Public Access)
Deseret Test Center (No Public Access)
Wendover Range (No Public Access)
Hill Air Force Range (No Public Access)
Great Salt Lake Desert
Great Salt Lake
Bear River Migratory Bird Refuge
Golden Spike Natl Hist Site
Fish Springs N.W.R.
Little Sahara Rec. Area
Dinosaur Natl. Monument
Yampa Plateau
Roan Cliffs
Book Cliffs
Bad Land Cliffs
Grand River Valley
Gray Canyon
Sweet Water Canyon
Green River Valley
San Rafael Valley
San Rafael Swell
Coal Cliffs
Wasatch Mts.
Uinta Mts.
Hogup Mts.
Newfoundland Mts.
Grouse Creek Mts.
Hansels Mts.
Terrace Mts.
Dolphin Island
Promontory Mts.
Lakeside Mts.
Cedar Mts.
Dugway Range
Fish Springs Range
Sevier Desert
Black Rock Desert
Cricket Mts.
Wah Wah Mountains
Mineral Mts.
Confusion Range
Escalante Desert
Kaiparowits Plateau
Smoky Mountain
Vermilion Cliffs
Waterpocket Fold
Henry Mts.
White Canyon
Elk Ridge
Comb Ridge
Valley of the Gods
Cottonwood Canyon
Orange Cliffs
Gateway
Devils Garden
Arches
Delicate Arch
The Windows
Fisher Towers
Castle Valley
Professor Valley
Dead Horse Point
Island in the Sky
Anticline Overlook
Needles Overlook
Wilson Arch
Church Rock
Summit Point
Le Sal Jct
Le Sal
Paradox
Egnar
Dove Creek
Pleasant View
Gateway Natl Fo
Uncompahgre
Grand Junctio
Colorado Natl Mon
Box Elder
Tooele
Juab
Millard
Sanpete
Sevier
Carbon
Emery
Grand
Wayne
Garfield
Kane
Iron
Beaver
Piute
Duchesne
Uintah
Summit
Morgan
Davis
Weber
Rich
Cache
Carrington
Antelope I.
Dolphin Island
Golden Spike Natl Hist Site
Bear River Migratory Bird Refuge
Hill Air Force Range (No Public Access)
Wendover Range (No Public Access)
Dugway Proving Grounds (No Public Access)
Deseret Test Center (No Public Access)
Skull Valley Ind. Res.
Kaibab Ind. Res.
Uintah and Ouray Indian Reservation
Navajo Indian Reservation
Glen Canyon National Recreation Area
Canyonlands Natl. Park
Arches Natl. Park
Natural Bridges Natl. Monument
Hovenweep National Monument
Dixie National Forest
Kaibab National Forest
Fishlake National Forest
Manti La Sal Natl. Forest
Ashley Natl. Forest
Uinta Natl. Forest
Wasatch Natl. Forest
Uinta Mts.
High Uintas Wilderness Area
Flaming Gorge Natl. Recreation Area
Dinosaur Natl. Monument
Yampa Plateau
Roan Cliffs
Book Cliffs
Bad Land Cliffs
Grand River Valley
Gray Canyon
Sweet Water Canyon
San Rafael Valley
San Rafael Swell
Coal Cliffs
Wasatch Mts.
Uinta Mts.
Hogup Mts.
Newfoundland Mts.
Grouse Creek Mts.
Hansels Mts.
Terrace Mts.
Dolphin Island
Promontory Mts.
Lakeside Mts.
Cedar Mts.
Dugway Range
Fish Springs Range
Sevier Desert
Black Rock Desert
Cricket Mts.
Wah Wah Mountains
Mineral Mts.
Confusion Range
Escalante Desert
Kaiparowits Plateau
Smoky Mountain
Vermilion Cliffs
Waterpocket Fold
Henry Mts.
White Canyon
Elk Ridge
Comb Ridge
Valley of the Gods
Cottonwood Canyon
Orange Cliffs
Gateway
Devils Garden
Arches
Delicate Arch
The Windows
Fisher Towers
Castle Valley
Professor Valley
Dead Horse Point
Island in the Sky
Anticline Overlook
Needles Overlook
Wilson Arch
Church Rock
Summit Point
Le Sal Jct
Le Sal
Paradox
Egnar
Dove Creek
Pleasant View
Gateway Natl Fo
Uncompahgre
Grand Junctio
Colorado Natl Mon
Box Elder
Tooele
Juab
Millard
Sanpete
Sevier
Carbon
Emery
Grand
Wayne
Garfield
Kane
Iron
Beaver
Piute
Duchesne
Uintah
Summit
Morgan
Davis
Weber
Rich
Cache
Carrington
Antelope I.
See map page 96
See map page 98
See map below
928061-13

APPENDIX B
GROUNDWATER TREATMENT SYSTEM GUIDELINES

1. Environmental.

1.1. Criteria. The following design criteria apply to this project:

1.1.1. **Outside Fire Protection.**

Publication No. 24 National Fire Prevention Assoc.

1.1.2. **Environmental, Sanitary, and Industrial Sewerage system.**

Recommended Standards for Sewage Works by the Great Lakes-Upper Mississippi River Board of Sanitary Engineers

Safe Drinking Water Act (SDWA)

Clean Water Act (CWA)

Resource Conservation and Recovery Act (RCRA)

National Environmental Policy Act (NEPA)

Applicable local, state, and federal regulatory requirements.

1.1.3. **Cover Requirements.** Gravity sewer lines shall be buried a minimum depth of 3 feet.

1.2. Exceptions to Design Criteria Package. If the above criteria violate regulatory requirements, local codes or ordinances, or if contrary to generally accepted local practice, notify the Omaha District for resolution prior to proceeding with design.

1.3. Special Instructions-Groundwater Treatment Facility. The Contractor shall design a treatment facility suitable for treating groundwater contaminated with BTEX at levels up to 150 mg/l. Treated effluent shall contain less than 25 mg/l TPH for discharge to the sanitary sewer. Effluent Standards shall be based on local, state, and federal regulatory requirements. The treatment facility should be designed and automated to operate on a manning level of one qualified person operating the facility 8-hours a day, 5-days a week. Emergency alarms and an automatic dialer shall be incorporated into the design for off-hours operation. The sizing of the treatment plant process equipment shall be based on the results of previous groundwater pump tests. Flow has been estimated to be approximately 50 gallons per minute (gpm). The treatment plant design shall have a return line which will enable the effluent to be recycled back to the head of the plant. The Contractor shall be responsible for siting and design of the treatment facility, groundwater collection system, effluent discharge system, and utility systems. Schematic diagrams and hydraulic profiles of all treatment processes shall be provided by the Contractor. The design shall include but not be limited to the following treatment processes:

1.3.1. **Biological Treatment.** The biological treatment shall involve contacting the waste stream with a large population of microorganisms which will degrade the contaminants. The biological treatment unit shall treat both the extracted groundwater and the vacuum extraction air stream. The A-E shall in the design describe the biodegradability of the contaminants and the ability to maintain a sufficient population of the microorganisms. The biological treatment system shall be designed based on the results of the on-site treatability testing previously conducted. The biological treatment system shall include aeration equipment, nutrient feed equipment, reactor vessels and any other equipment needed to make a complete treatment process. The Contractor shall estimate all removal efficiencies, influent and effluent characteristics, sludge production, unit sizing, and nutrient requirements.

1.3.2. **Piping Systems.** The Contractor shall design a piping system for transport of groundwater from the extraction wells to the treatment facility and a piping system capable of discharging treated effluent to the sanitary sewer. Piping materials shall be suitable for transporting BTEX contaminated groundwater as well as free product.

1.3.3. **Decontamination Fluids and Other Contaminated Liquid Wastes.** The design shall include provisions for handling decontamination fluids and other liquid wastes which are generated during construction. Decontamination fluids will be generated during high pressure, low volume spraying of trucks, equipment, or personal protective equipment at the decontamination pad. Other liquid wastes will be generated by dust control measures, runoff prevention, dewatering, etc.. The decontamination fluids and other contaminated liquid wastes shall be temporarily stored on site until the treatment facility is operational and can treat and discharge the liquids.

1.3.4. **Contractor Operational Requirements.**

1.3.4.1. Contractor System Start-up and Operation. The Contractor shall operate and maintain the groundwater treatment facility for a period of 60 days. The minimum requirements to be performed include influent and effluent sampling, monitoring well observation, extraction and treatment system operation and maintenance, recordkeeping and reporting.

1.3.4.2. Facility Operation and Maintenance Manual and Start-Up Training. The contractor shall provide a complete Facility Operation and Maintenance Manual for the groundwater collection and treatment system. The Contractor shall also conduct a training course for future operating personnel.

1.4. Work Plan. The Work Plan documents shall include drawings and supporting data as specified below.

1.4.1. Drawings shall contain the following at a minimum:

1.4.1.1. Provide a site plan showing major unit treatment items and their relationship to existing facilities. Include exterior yard piping (new and existing). For clarity, do not show site dimensions, siting notes or topographic contours on this drawing.

1.4.1.2. Include drawings showing schematic flow diagrams for each treatment process.

1.4.1.3. Include a hydraulic profile.

1.4.1.4. For all buildings, include a floor plan showing equipment layout and single line piping with tentative sizes

1.4.1.5. Provide at least one section through each structure showing pertinent elevations and pipe locations

1.4.2. Supporting Data. The following items should be included under the chapter for Water and Wastewater (when applicable).

1.4.2.1. List of applicable criteria.

1.4.2.2. Applicable State and/or Federal water quality and/or effluent standards.

1.4.2.3. Complete lab analysis of wastewater to be treated.

1.4.2.4. Design flow rates

1.4.2.5. Special requirements for industrial wastewater treatment (or pretreatment facilities), i.e. acid and/or oily water.

1.4.2.6. Narrative description of proposed unit processes including capacities.

1.4.2.7. Anticipated effluent quality.

1.4.2.8. Narrative description of instrumentation and controls.

1.4.2.9. Calculations necessary to support equipment sizing, design flow rates, etc.

APPENDIX C
CHEMISTRY INSTRUCTIONS

SCOPE OF SERVICES
FOR
RAPID RESPONSE REMEDIAL ACTIONS
NAPLES TRUCK STOP
VERNAL, UTAH

CHEMISTRY INSTRUCTIONS
JUNE 1994

1 Contractor Sampling and Analysis Plan. This appendix describes the Contractor's responsibilities with respect to the sampling and analysis entailed in this work effort. This shall include any sampling and analytical testing required by State and Federal regulations as well as potential disposal facilities. The Contractor shall be responsible for the development and implementation (upon USACE approval) of the Contractor Sampling and Analysis Plan (CSAP). The CSAP is intended to be a site specific guidance for the field team for the project required sampling and analysis. The CSAP shall detail all field activities, laboratory activities, and documentation related to the chemical data. The CSAP shall include a list of equipment to be taken to the field, details of the sampling locations and methodologies including field screening methods to be employed, decontamination procedures, quality control procedures, sample custody and shipments information, analytical methods, and all additional items described within this appendix and other portions of this scope. Number and types of samples and bottle/preservation requirements shall be presented in tabular form. All of the above shall be performed in a manner consistent with the most recent EPA guidelines as outlined in SW-846, the USACE guidance document ER 1110-1-263 Appendix E, and any applicable State of Utah requirements.

2 Site History/Project Description. Investigations at Naples Truck Stop indicate the presence of a floating fuel plume on the ground water and dissolved phase contamination of the groundwater. This project consists of the installation of a biotreatment system, and disposal of contaminated soil if required. Additionally, the Contractor shall develop, as part of the Operation and Maintenance Manual, a sampling and analysis plan for any sampling and analysis required during the operation of the biotreatment system.

2.1 Water Samples. Additional monitoring wells shall be installed to assist in the capture and delineation of the plume. The Contractor shall propose the number and location for the additional wells in the Work Plan for USACE approval. The level of floating product shall be measured and the wells shall be sampled according to standard sampling protocols and analyzed for the parameters described in Section 8: Analytical Requirements.

2.2 Soil Samples. Soil samples will be collected for field screening during the installation of the monitoring wells. These samples shall be collected every 5 feet and screened as described

in Attachment 1. Careful field documentation of field screening results is essential.

2.3 Biotreatment System Monitoring. The Contractor is required to collect samples at regular intervals to assure the treatment system is functioning. The Contractor shall collect 1 sample a week for the first month and one sample a month thereafter.

2.4 Treated Water. The Contractor shall investigate the requirements for disposal of the treated water at a POTW. Sampling schedule shall be as required by the Facility. The anticipated parameters are listed in Section 8: Analytical Requirements. For estimating purposes the Contractor shall assume one initial characterization sample for the "Waste Water Treatment" parameters listed in Section 8. For continued acceptance; the Contractor shall anticipate one sample each week for the first month, and one sample per month thereafter for BTEX only.

2.5 Investigation Derived Wastes. The following are the anticipated waste streams. Each of these waste streams shall be investigated for disposal options. Any analytical protocols necessary for acceptance of these wastes by facilities shall be proposed within the CSAP for USACE approval.

2.5.1 Waste water. Development water from the monitoring wells and decontamination water shall be containerized and analyzed for disposal purposes. If appropriate, the decontamination water may be combined with the water for biotreatment for disposal at the POTW. The expected analysis are outlined in Section 8: Analytical Requirements. If additional analysis is required by potential TSD facilities, the Contractor shall detail these requirements in the CSAP.

2.5.2 Contaminated Soil. The Contractor shall be responsible for proper packaging and disposal of all contaminated soils generated during this work effort. For estimating purposes, the Contractor shall assume one (1) soil sample shall be collected. This sample shall be analyzed for petroleum disposal parameters. The expected analysis are outlined in Section 8: Analytical Requirements. Any additional analysis required by the disposal facilities for the contaminated soils shall be proposed in the CSAP for USACE approval.

3 Decontamination.

3.1 Decontamination Procedures. All sampling equipment shall be disposable, stainless steel, or teflon and shall undergo decontamination procedures in accordance with Utah regulations as follows (except disposable):

3.1.1 Non-phosphate laboratory detergent wash and

brushing to remove large particles;

3.1.2 A tap water rinse;

3.1.3 An organic free deionized water rinse;

3.1.4 A pesticide grade isopropanol rinse;

3.1.5 An organic free deionized water rinse.

NOTE: The USACE discourages the used of methanol or other targeted organic for decontamination.

3.2 Disposal of Liquids. All liquids generated during decontamination procedures shall be collected and disposed of in accordance with all applicable State of Utah and Federal regulations.

4 Sample Handling, Preservatives, and Holding Times. The samples are to be placed in appropriately labelled sample containers, preservatives added (if required), enclosed within a plastic zip-lock bag, and placed in a chilled cooler. Once the samples for the day are acquired, the required paperwork shall be completed, the cooler packed with fresh coolant and packing material, custody seals attached, the samples shall be shipped or delivered to the designated laboratory. Sample packaging, shipping, and chain-of-custody shall follow all applicable USEPA, USACE and State of Utah guidelines, and shall be detailed in the CSAP. USACE guidelines are outlined in the document Sample Handling Protocol for Low, Medium, and High Concentration Samples of Hazardous Waste, (ER 1110-1-263, Appendix E, 1 October 1990). No sample shall be held on site for more than twenty-four (24) hours.

5 Documentation. The system for identifying and tracking the samples shall be described, and shall include the recording of field data in permanently bound notebooks along with Daily Quality Control Reports (Attachment 2). These shall be sent to the USACE PM on a weekly basis or at the conclusion of each sampling event.

6 Sample Labels. Correct sample labeling and the corresponding notation of the sample identification numbers in the field logbook are necessary to prevent misidentification of samples and their eventual results. The CSAP shall explicitly define the numbering system to such detail that sample results may be tracked to the corresponding field samples. Special care must be give to the numbering of the field duplicates as to keep the them blind to the laboratory. All sample labels shall be filled out legibly with indelible ink, affixed to the sample bottle, and covered with clear tape. These labels are to include the following at a minimum:

6.1 Name/initials of the collector;

6.2 Date and time of collection;

6.3 Place of collection;

6.4 Sample ID number (must uniquely identify each sample in regard to project, station location, etc.);

6.5 Analysis required;

6.6 Preservatives added;

6.7 Designation between "grab" or "composite" samples.

7 Chain-of-Custody/Sample Shipment. Chain-of-Custody shall be maintained for all samples collected during this project. It is very important that the information on the Chain-of-Custody form match the information on the sample bottles. Chain-of-Custody forms shall be completed for every cooler, and shall be sealed in a zip-lock bag and taped to the inside of the lid of the cooler. A minimum of two signed custody seals will be required on the outside of the coolers, one on the front and one on the rear of the cooler both covered with clear tape. Chain-of-Custody procedures shall be in accordance with USACE Sample Handling Protocol and USEPA procedures. All samples shall be shipped via overnight delivery or hand delivered to the receiving laboratory. The Contractor shall define, in the CSAP, the name, address, telephone number, and a POC at the laboratory which will be utilized for the analysis of the samples. The receiving laboratory shall be notified by the Contractor approximately 1 week prior to the arrival of the first sample shipment and at least twenty-four (24) hours notice given for Saturday delivery.

8 Analytical. An appropriate analytical protocol shall be proposed by the Contractor for the samples. The laboratory shall be certified by the State of Utah. The following analytical methods are recommended for the samples taken from the previously described areas. The methods to be used, along with appropriate digestion/extraction methods, must be specified in the CSAP unless otherwise approved by the Corps of Engineers. These methods must be EPA-approved and consistent with any applicable State of Utah requirements. These methods must be followed explicitly including all quality control procedures detailed in the respective methods unless otherwise authorized by the Corps of Engineers.

8.1 Monitoring Well Water Samples.

8.1.1 BTEX SW-846 8020

8.2 Water Samples for System Performance.

8.2.1 BTEX SW-846 8020

8.2.2 Water Quality

Phosphorus, Total
Chemical Oxygen Demand\Chemical Oxygen Demand
Total Kjeldahl Nitrogen
Ammonia
Nitrate\Nitrite
Hardness
Total Organic Carbon
Carbonate\bicarbonate
Alkalinity
Sulfate
Chloride
pH
Total Suspended Solids\Total Dissolved Solids
Dissolved Oxygen

8.3 Water Disposal - POTW requirements. It is anticipated that waste water may be treated by the biotreatment system or by conventional waste water treatment. The analytical suite shall be comparable to the following, however the Contractor shall propose the waste water treatment facilities' analytical package in the CSAP for approval. It is also anticipated that a full suite will be required for the initial acceptance only. A limited characterization should be acceptable for continued acceptance by the POTW.

Full Suite:

Conventionals

pH
Alkalinity
Total Cyanide
Total Phenols
Total Ammonia
Oil and Grease
Total Solids

Total Metals

As, Ba, Ca, Cd, Cr, Cu, Fe, Pb, Mn, Hg, Ni, Se, Ag, Tl, Zn

Organics

Volatile Organics (GC/MS + TIC's)
Semi-volatile Organics (GC/MS + TIC's)
Pesticides/PCB's
Herbicides

Limited:

BTEX

8.4 Investigation Derived Waste (IDW).

8.4.1 Soil. The Contractor shall investigate the availability of a landfarm or petroleum landfill for disposal of

the drill cuttings. The anticipated analytical requirements are:

TPH-L	SW-846 8015 Modified
TRPH-H	418.1
TCLP Volatiles	SW-846 1311/8240

8.4.2 PPE. The Contractor shall investigate the requirements of the local landfill for disposal of the PPE.

9 Method Detection Limits. Detection limits for the analyses shall be according to applicable EPA methodologies or Standard Methods unless otherwise stated. Detection limits shall be summarized in the CSAP. Data reports shall also list specific detection limits for constituents analyzed.

10 Calibration Procedures/Frequency. Calibration of the analytical instrumentation to be used for this project is to be outlined in the CSAP. Calibration requirements and the frequency associated with them shall be in accordance with the individual methods.

11 Laboratory Quality Control. The Contractor shall perform the quality control procedures as described in the reference methods. This includes reagent blanks, laboratory replicates, matrix spikes and duplicates, and surrogate standards. If acceptable windows (as outlined in SW-846 for matrix spike/surrogate recoveries are not met in the first analytical run, the laboratory shall be responsible to rerun the sample to prove matrix affects at no expense to the government. The Contractor shall summarize windows of acceptability for spikes/surrogates and actions to be taken in the event of out-of-control situations in the CSAP. The CSAP shall describe in detail the laboratory QC procedures including specific compounds and their performance criteria.

12 Laboratory Turn Around Time. The Contractor shall require no longer than a 30 day turn around time (from receipt of samples) for the analytical results from the laboratory. To avoid down-time at the site, quick turn-around-time may be warranted. Any quick turn-around-times used shall be proposed with justification in the CSAP.

13 QA/QC Problems. All QA/QC problems in the field or in the laboratory shall be reported immediately to the USACE on-site Construction Representative and to the USACE Project Manager within twenty-four (24) hours.

14 Data Assessment and Evaluation. Data assessment and evaluation for this project shall be performed by the Contractor. A plan for this activity shall be proposed in the required CSAP. Data, including all quality control information, are to be reported on forms as presented in SW-846 (third edition). Raw data are not required in the report package. Results for soil samples shall be reported on a dry weight basis.

14.1 General Organic And Inorganic Reporting. For each analytical method run, the Contractor shall report all analytes for each sample as a detected concentration or as less than the specific limits of quantitation. Each analytical method run shall be clearly identified as belonging to a specific analytical batch. Generally, all samples with out-of-control spike recoveries being flagged for matrix interferences shall be designated as such. Appropriate data flags such as CLP shall be used. All soil samples shall be reported on a dry-weight basis with percent moisture also reported unless otherwise approved. The Contractor shall also report dilution factors for each sample as well as the date of extraction (if applicable) and date of analysis.

14.1.1 Internal Quality Control Reporting. A complete set of Quality Control results shall be reported for each analytical batch even if some of the QC was not performed on samples from this Corps of Engineers project. The QC results shall include but not limited to laboratory blanks, surrogate and matrix spike recoveries, laboratory duplicates and/or matrix spike duplicate pairs. At a minimum, internal quality control samples shall be analyzed at rates specified in the specific methods or higher rates if required to meet project specific objectives.

ATTACHMENT 1
SOIL VOLATILE VAPOR HEADSPACE

* The A-E shall screen all soil samples for Volatile Organic Compounds (VOC's) in the field at the time of excavation. Field screening shall utilize an Organic Vapor Analyzer (OVA) equipped with a photo-ionization detector (PID) or a flame-ionization detector (FID). (If a high humidity condition exists during the time period which field activity is performed, the PID would not be a reliable screening instrument.) Lamp voltage for the PID shall also be optimum for contaminants. Screening procedures shall include the following:

* Place soil from the bottom of the excavation in a clean 8 ounce jar, so that the jar is about half-filled;

* Seal each jar with one sheet of aluminum foil with the screw cap applied to secure the aluminum foil; no holes allowed in the foil cap;

* Vigorously agitate sample jar for at least thirty (30) seconds;

* Allow a 15 minute equilibration period, at ambient temperature, for headspace development;

* If ambient temperatures are below 32° F (0° C), headspace development is to be within a heated vehicle or building and out of direct sunlight (e.g., avoid the placement of samples on the dash of a vehicle);

* Following the equilibration period, the headspace shall be measured by quickly inserting the vapor sampling probe through the aluminum foil and recording the maximum meter response (should be within first 2-5 seconds). Erratic responses should be discounted as a result of high organic vapor concentration or conditions of elevated headspace moisture;

* Record headspace screening data from each jar;

* If elevated field screening readings exist, then additional excavation is required. This shall be determined by the Project Chemist, Corps of Engineers, Omaha District and the Representative from the State of Utah through the Contracting Officer Representative (COR);

* Organic vapor analyzer instruments shall be operated and calibrated to yield "Total Organic Vapors" in parts per million (ppm) as isobutylene. PID instruments shall be operated with the correct eV lamp source for suspected contaminants (aromatics to include benzene, toluene,

ethylbenzene and xylenes). Calibration must be checked/adjusted no less than once every ten (10) analyses, or daily.

* If sample jars are to be reused in the field, jars must be cleaned according to field decontamination procedures for cleaning of sampling equipment. In addition, headspace readings must be taken to ensure no residual organic vapors exist in the cleaned sample jars.

* Any deviation(s) from these procedures must be noted on the field logs and a basis for the deviation(s).

ATTACHMENT 2
DAILY QUALITY CONTROL REPORT

DAILY QUALITY CONTROL REPORT

PROJECT:_____

LOCATION:_____

Date:_____

Weather:_____
Temp. _____
Wind _____
Humidity_____

PERSONNEL

Name	Position	Hours Worked

EQUIPMENT

Description

FIELD INSTALLATIONS

ID No(s)._____
Drilled:
from_____
to_____
Footage_____
Casing Set:_____
Screen_____
Riser_____

Hours Drilling_____
Hours Installing_____
Hours Decon_____
Hours Development_____
Hours Sampling_____
Hours Shut Down _____
# of samples:_____Type _____
_____ _____
_____ _____
_____ _____

Description of work performed:_____

Health and Safety Levels_____

Problems encountered:_____

Any changes from work plan?_____

Signature:_____

ATTACHMENT 3

COOLER RECEIPT FORM

PROJECT:_____LIMS#_____

USE OTHER SIDE OF THIS FORM TO NOTE DETAILS CONCERNING CHECK-IN PROBLEMS.

A. **PRELIMINARY EXAMINATION PHASE:** Date cooler opened:_____ C-of-C Number:_____

by (print)_____(sign)_____

1. Did cooler come with a shipping slip (air bill, etc)?..... YES NO

   If YES, enter carrier name & air bill number here:_____

2. Were custody seals on outside of cooler?..... YES NO

   How many & where:_____, seal date:_____, seal name_____

3. Were custody seals unbroken and intact at the data and time of arrival?..... YES NO

4. Did you screen samples for radioactivity using the Geiger Counter?..... YES NO

5. Were custody papers sealed in a plastic bag & taped inside to the lid?..... YES NO

6. Were custody papers filled out properly (ink, signed, etc.)?..... YES NO

7. Did you sign custody papers in the appropriate place?..... YES NO

8. Was project identifiable from custody papers?. If yes, enter project name at the top of this form.... YES NO

9. If required, was enough ice used?..... Type of ice:_____..... YES NO

10. Have designated person initial here to acknowledge receipt of cooler:_____(date)_____

B. **LOG-IN PHASE:** Date samples were logged-in:_____

by (print)_____ (sign)_____

11. Describe type of packing in cooler:_____

12. Were all bottles sealed in separate plastic bags?..... YES NO

13. Did all bottles arrive unbroken & were labels in good condition?..... YES NO

14. Were all bottle labels complete (ID, date, time, signature, preservative, etc.)?..... YES NO

15. Did all bottle labels agree with custody papers?..... YES NO

16. Were correct containers used for the tests indicated?..... YES NO

17. Were correct preservatives added to samples?..... YES NO

18. Was a sufficient amount of sample sent for tests indicated?..... YES NO

19. Were bubbles absent in volatile samples? If NO, list by Sample #_____ YES NO

20. Was the project manager called and status discussed?. If yes, give details on the back of this form. YES NO

21. Who was called?_____ By whom?_____(date)_____

APPENDIX D
HEALTH AND SAFETY INSTRUCTIONS

APPENDIX C

HEALTH AND SAFETY INSTRUCTIONS (FOR RAPID RESPONSE FIELD ACTIVITIES)

7 JULY 1994

INDEX

1. General. The Rapid Response Contractor responsible for the tasks defined by this scope of work shall review all information provided and develop the necessary documents which contain the health and safety criteria, procedures, and practices sufficient to protect on-site personnel, the environment, and potential off-site receptors from the chemical, physical, and/or biological hazards particular to this site. The Contractor shall utilize the services of a Certified Industrial Hygienist (CIH) experienced in hazardous waste site operations to oversee the development and implementation of the health and safety documents required by this section. If the information made available is insufficient to allow the Contractor to develop these documents, a description of all additional information required shall be prepared and submitted to the Contracting Officer (CO).

2. Regulatory Requirements. All site investigation/removal activities and health and safety documents required by this scope of work shall comply with and reflect the following regulations and appropriate guidance publications, as a minimum:

2.1. Federal Acquisition Regulation, F.A.R. Clause 52.236-13: Accident Prevention.

2.2. U.S. Army Corps of Engineers (USACE), Safety and Health Requirements Manual, EM 385-1-1 (latest revision).

2.3. Occupational Safety and Health Administration (OSHA) Construction Industry Standards, 29 CFR 1926, and General Industry Standards, 29 CFR 1910; especially 29 CFR 1910.120 - "Hazardous Waste Site Operations and Emergency Response".

2.4. NIOSH/OSHA/USCG/EPA, "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities", October 1985.

2.5. Other applicable Federal, State, and local safety and health requirements.

3. Documents. The following health and safety documents are required to be developed under this scope of work. Avoid providing material of a general nature, not specifically related to this project or site. Information readily available in standard texts should be repeated only to the extent necessary to meet the requirements of this scope. The Safety and Health Program will contain general information required by the referenced OSHA standard and EM 385-1-1 which is applicable to all hazardous waste activity efforts performed by the contractor. The Site Safety and Health Plan should be a brief document addressing only site-specific safety and health requirements and procedures based upon site-specific conditions. Duplication of the general information contained in the Safety and Health Program is unwanted.

3.1. Safety and Health Program. All contractors and their subcontractors performing on-site activities at hazardous waste sites are required by regulation to develop and maintain a written Safety and Health Program in compliance with OSHA standard 29 CFR 1910.120 (b)(1) through (b)(4). Written certification that such a program has been prepared and implemented shall be submitted to the CO as a preface to required Site Safety and Health Plans (SSHP). The program including updates shall be made available to the CO in its entirety upon request. Advanced Agreement #19 under the Rapid Response Contract has fulfilled this requirement.

3.2. Contractor Site Safety and Health Plan (SSHP). The Site Safety and Health Plan required by 29 CFR 1910.120 (b)(4) shall be prepared by the Contractor and submitted to the Contracting Officer for review and approval prior to the commencement of any on-site work activity to be performed by the Contractor and/or his subcontractors. This SSHP shall describe the health and safety procedures, practices, and equipment to be implemented and utilized in order to protect affected personnel from the potential hazards associated with the site-specific tasks to be performed. The level of detail provided in the SSHP shall be tailored to the type of work, complexity of operations to be accomplished, and hazards anticipated. All topics required by OSHA standard 1910.120 (b)(4), and those described below, shall be addressed in the SSHP. Where the use of a specific topic is not applicable to the project, provide a negative declaration to establish that adequate consideration was given the topic, and give a brief justification for its omission.

3.2.1. Site Description and Contamination Characterization. Describe the location, topography, and approximate size of the site, the on-site jobs/tasks to be performed, and the duration of planned site activities. Compile a complete list of the contaminants found or known to be present in site areas to be impacted by the work to be performed. Compilation of this listing shall be based on results of previous studies; or if not available, select the likely contaminants based on site history

and prior site uses/activities. Include chemical names, concentration ranges, media in which found, locations on-site, and estimated quantities/volumes to be impacted by site work, if known.

3.2.2. Hazard/Risk Analysis. Identify the chemical, physical, biological, and safety hazards of concern for each site task and/or operation to be performed. Selection of chemicals as indicators of hazard shall be based on media concentrations, toxicity, volatility or potential for air entrainment at hazardous levels, and frequency of detection. Describe chemical and physical properties of selected contaminants, sources and pathways of employee exposures, anticipated on and off-site exposure level potentials, and regulatory (including Federal, State, and local) or recommended protective exposure standards. Specify and justify "action levels" based upon airborne exposure hazards and direct skin contact potentials for upgrades/downgrades in levels personnel protection; for implementation of engineering and/or work practice controls; for emergency evacuation of on-site personnel; and for the prevention and/or minimization of public exposures to hazards created by site activities. Air monitoring/sampling shall be performed in accordance with Paragraph: "Exposure Monitoring/Air Sampling Program" below, resulting data compared with established "action levels", and appropriate corrective actions initiated as necessary.

3.2.3. Accident Prevention. The SSHP will serve as the Accident Prevention Plan (APP) and **preliminary** activity hazard analyses (phase plans), required by F.A.R. Clause 52.236-13, and Paragraphs 01.A.03 through 01.A.06 and Appendix Y of USACE EM 385-1-1. The APP shall be contained in the SSHP as a separate definable section. Thus, a separate APP is not necessary. The activity hazard analysis is an ongoing process from initiation of plan preparation through the implementation and completion of the field work. This is especially true under the Rapid Response Contracts. Therefore, the activity hazard analysis shall consist of two specific phases, the first of which shall be detailed in the SSHP submittal process to meet the intent of 29 CFR 1910.120 and paragraph: "Contractor Site Safety and Health Plan" of this section. The phase safety plans shall be outlined and developed to the full extent possible prior to SSHP submittal. **Phase two of the activity hazard analysis (phase plans) as required by the APP shall be developed on-site by the Contractor's supervisory staff prior to beginning any specific activity and incorporated into the SSHP on an ongoing basis throughout the duration of the field activities. Any additional topics required by EM 385-1-1, but not specifically covered in paragraph: "Contractor Site Safety and Health Plan" of this scope of work, shall also be addressed in an Accident Prevention section of the SSHP under the phase safety field development process.** Daily safety and health inspections shall be conducted to determine if operations are being performed in accordance with the SSHP, USACE and OSHA regulations, and contract requirements. In the event of an accident/incident, the Contractor shall immediately notify the CO. Within two (2) working days of any reportable accident, the Contractor shall complete and submit to the CO an Accident Report on ENG Form 3394 in accordance with AR 385-40 and USACE Supplements to that regulation.

3.2.4. Staff Organization, Qualifications, and Responsibilities. Discuss the organizational structure, including lines of authority (chain of command), and overall responsibilities of the contractor and all subcontractors for site activities, including supervisor/employee relationships. Summarize the operational and health and safety responsibilities and qualifications of each key person identified. Specifically: (1) A Certified Industrial Hygienist (CIH) with experience in the hazardous waste site operations shall be responsible for the development, implementation, and oversight of the Safety and Health Program and SSHP. The SSHP shall be signed and dated by the CIH prior to submittal. (2) A fully trained and experienced Site Safety and Health Officer (SSHO), responsible to the contractor and the CIH, may be delegated to implement and continually enforce the safety and

health program and site-specific plan elements on-site. (3) At least one person certified in first aid/CPR by the Red Cross, or equivalent agency, shall be continuously present on-site during site operations. **The Contractor shall further evaluate the necessity of an Emergency Medical Technician (EMT) for all or portions of the required removal activities. This evaluation shall be reflected in the task specific scheduling and work sequence as presented in the Contractor Work Plan.**

3.2.5. Training. All personnel performing on-site activities shall have completed applicable training in accordance and compliance with 29 CFR 1910.120(e). In addition, site-specific training covering site hazards, procedures, and all contents of the approved SSHP shall be conducted by the SSHO for on-site employees and visitors prior to commencement of work or entering the site. The type, duration, and dates of all employee training performed shall be listed by employee name and certified in the SSHP.

3.2.6. Personal Protective Equipment (PPE). In accordance with 29 CFR 1910.120(g)(5), a written Personal Protective Equipment (PPE) program which addresses all the elements listed in that regulation, and which complies with respiratory protection program requirements of 29 CFR 1910.134 is to be included in the Safety and Health Program. Therefore, the Contractor SSHP shall detail the minimum PPE ensembles (including respirators) and specific materials from which the PPE components are constructed for each site-specific task/operation to be performed, based upon the hazard/risk analysis performed above. Components of levels of protection (A,B,C,D and modifications) must be relevant to site-specific conditions, including heat stress potential and safety hazards. Include site-specific procedures for on-site fit-testing, cleaning, maintenance, inspection, and storage.

3.2.7. Medical Surveillance. All personnel performing on-site activities shall be participants in an ongoing medical surveillance program, meeting the requirements of 29 CFR 1910.120 and ANSI Z-88.2. A description of the general medical surveillance program is to be included in the Safety and Health Program. All medical surveillance protocols and examination results shall be reviewed by a licensed physician who is certified in Occupational Medicine by the American Board of Preventative Medicine, or who, by necessary training and experience, is Board-eligible. The SSHP shall only describe the content and frequencies of any additional medical tests/examinations/consultations determined necessary by the physician due to probable site-specific conditions, potential occupational exposures, and required protective equipment. Certification of participation in the medical surveillance program, the date of last examination, and name of reviewing occupational physician shall also be included for each affected employee. The written medical opinion from the attending physician required by 29 CFR 1910.120(f)(7) shall be made available upon request to the CO for any site employee.

3.2.8. Exposure Monitoring/Air Sampling Program (Personal and Environmental). Where it has been determined that there may be employee exposures to and/or off-site migration potentials of hazardous airborne concentrations of hazardous substances, appropriate direct-reading (real-time) air monitoring and integrated (time-weighted average (TWA)) air sampling shall be conducted in accordance with applicable regulations (OSHA, EPA, State). Both air monitoring and air sampling must accurately represent concentrations of air contaminants encountered on and leaving the site. Sampling and analytical methods following NIOSH (for on-site personnel and site perimeter locations) and/or EPA (for site perimeter or off-site locations) criteria shall be appropriately utilized. Personnel samples shall be analyzed only by laboratories successfully participating in and meeting the requirements of the American Industrial Hygiene Association's (AIHA) Proficiency Analytical Testing (PAT) or Laboratory Accreditation programs. Meteorological monitoring shall be performed on-site as needed and used as an adjunct in determining perimeter and any off-site monitoring/sampling locations. Where perimeter monitoring/sampling is not deemed necessary, provide a suitable justification for its exclusion. Noise monitoring and radiation monitoring (alpha, beta, gamma) shall be conducted as needed, depending on the site hazard assessment. All monitoring/sampling results shall be compared to "action levels" established pursuant to Paragraph: "Hazard/Risk Analysis", above, to determine acceptability and need for corrective action.

3.2.9. Heat/Cold Stress Monitoring. Heat and/or cold stress monitoring protocols shall be implemented, as appropriate. Work/rest schedules shall be determined based upon ambient temperature, humidity, wind speed (wind chill), solar radiation intensity, duration and intensity of work, and protective equipment ensembles. Minimum required physiological monitoring protocols which will affect work schedules shall be developed. In cases where impervious clothing is worn (full-body), the NIOSH/OSHA/USCG/EPA "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities" protocol for prevention of heat stress shall be followed, and heat stress monitoring shall commence at temperatures of 70 degrees Fahrenheit and above. Where impervious clothing is not worn, the most current published ACGIH heat stress standard (TLV) shall be used. For cold stress monitoring to help prevent frostbite and hypothermia, the most current published ACGIH cold stress standard shall be referenced and followed, as a minimum.

3.2.10. Standard Operating Safety Procedures, Engineering .Controls and Work Practices. Address the following elements as a minimum: (1) Site rules/prohibitions (buddy system, eat/drink/smoking restrictions, etc.); (2) Material handling procedures (soils, liquids, radioactive materials); (3) Drum/ container handling procedures and precautions (opening, sampling, overpacking); (4) Confined space entry procedures; (5) Hot-work, sources of ignition, and electrical safety (ground-fault protection, overhead power line avoidance, etc.); (6) Excavation safety; (7) Machine guarding; (8) Fall protection; (9) Illumination; (10) Sanitation; (11) Engineering controls.

3.2.11. Site Control Measures. Include a site map containing work zone delineation (EZ, CRZ, SZ, access points and emergency egress locations. Describe on-site and off-site communications, security (physical and procedural), and general site access.

3.2.12. Personal Hygiene and Decontamination. Specify necessary facilities and their locations. Detail standard operating procedures, frequencies, supplies and materials to accomplish decontamination of site personnel.

3.2.13. Equipment Decontamination. Specify necessary facilities, equipment, and their locations. Detail procedures, frequencies, supplies and materials, and methods to determine adequacy for the decontamination of equipment used on-site.

3.2.14. Emergency Equipment and First Aid Requirements. The following items, as appropriate, shall be immediately available for on-site use: (1) First aid equipment and supplies approved by the consulting MD; (2) Emergency eyewash/showers (comply with ANSI Z-358.1); (3) Emergency respirators (worst-case appropriate); (4) Spill control materials and equipment; and (5) Fire extinguisher(s) (specify type, size, locations).

3.2.15. Emergency Response and Contingency Procedures (On-Site and Off-Site). This section of the SSHP shall contain an Emergency Response Plan in compliance with 29 CFR 1910.120(l), which addresses the following elements, as a minimum: (1) Pre-emergency planning and procedures for reporting incidents to appropriate government agencies for potential chemical exposures, personal injuries, fires/explosions, environmental spills and releases, discovery of radioactive materials; (2) Personnel roles, lines of authority, communications; (3) Posted instructions and a list of emergency contacts: (physician, nearby medical facility, fire and police departments, ambulance service, federal/state/local environmental agencies, CIH, Contracting Officer); (4) Emergency recognition and prevention; (5) Site topography, layout, and prevailing weather conditions; (6) Criteria and procedures for site evacuation (emergency alerting procedures/employee alarm system, emergency PPE and equipment, safe distances, places of refuge, evacuation routes, site security and control); (7) Specific procedures for decontamination and medical treatment of injured personnel; (8) Route maps to nearest pre-notified medical facility; (9) Criteria for initiating community alert program, contacts, and responsibilities; and (10) Critique of emergency responses and follow-up.

3.3. Logs, Reports, and Recordkeeping. The following logs, reports, and records shall be developed, maintained, and submitted to the CO at the conclusion of the site work: (1) Training logs (site-specific, visitor); (2) Daily safety inspection logs (may be part of the Daily QC Reports); (3) Employee/ visitor register; (4) Environmental and personal exposure monitoring/sampling results.

4. Document Revisions, Addenda, and Field Modifications. Review comments issued prior to SSHP approval shall be incorporated by revising and reissuing affected pages. If major revisions are necessary, the entire Plan shall be resubmitted for review and approval. Minor changes affecting only a few pages may be made by addenda sheets and resubmitted. Once on-site, unanticipated field conditions encountered which were not addressed in the approved SSHP shall be immediately reported to the CO. Field activities in such areas shall be halted until the SSHP has been modified to reflect changed conditions and reviewed/approved by the CO.

5. Contracting Officer Approved Visitors. The Contractor shall continuously maintain on-site a minimum of four (4) sets of protective equipment (except for air-purifying respirators, prescription safety glasses, and safety shoes) for government visitor usage. These ensembles shall include all PPE specified in the SSHP.

6. Special Considerations. During document preparation phases, it is critical that task specific language within the various plans (Work Plan, SSHP, and CSAP) be complimentary. To this end, the Contractor shall present a hazard/risk analysis and other appropriate discussions and documentation for the following tasks, as a minimum:

6.1. Mobilization.

6.2. Site Preparation.

6.3. VEP Installation

6.4. Soil Staging

6.5.. Transportation and Disposal

6.6. Operation and Maintenance

6.7. Demobilization

6.8. Tank Items. Containers (bulk storage of fuels and associated vessels, etc.) The Contractor shall address tank siting criteria, burming, fire control etc.

6.9. Non-Tank Items. Non "tank" items that need to be evaluated, include as a minimum, the following drummed materials:

6.8.1. Soils and debris.

6.8.2. Drill cuttings and associated Investigative Derived Waste (IDW)

6.8.3. Miscellaneous Hazardous materials and hazardous waste storage and storage provisions.

7. Truck Operations. Truck operations shall be conducted in accordance with EM 385-1-1. All truck operators are required to have completed the OSHA 40 hour training.

8. Bulking Operations. Bulking Operations shall include:

8.1. location of operations area;

8.2. techniques and equipment; and

8.3. contingency planning.

9. Special Note to the Contractor. Paragraph 6 through 12 of this appendix shall be addressed using the format or one similar to that contained in the attachment entitled phase plans. This analysis should define in a direct manner both physical and chemical hazards for site specific tasks and present the anticipated control measures to be used. The Contractor is referred back to section 3.2.3 of this

appendix during the development of the SSHP. Based on the results of on going activities, the SSHP shall be modified and expanded on a daily basis.

10. Mobil Laboratory Operations and Contingency Plan. If an on-site laboratory is anticipated, the Contractor's chemistry and safety office shall review all appropriate site history data and tasks defined within this SOS to jointly develop a comprehensive Mobil Laboratory Operations Plan for implementation this site. This plan shall reflect the safest and most cost-effective procedures necessary to protect on-site employees, off-site personnel, and the residential community in the event of a contingency. The plan shall contain, as a minimum, the four criteria listed above and shall be comprehensive with respect to items Paragraph 10 through 13. The Mobil Laboratory Operations and Contingency Plan shall be submitted as specified in the Submittal Register.

10.1. Location of operations area (sighting criteria), materials storage.

10.2. Techniques and equipment including hazardous materials inventories.

10.3. Personnel qualifications and training.

10.4. Contingency planning.

11. Other Considerations.

11.1. It is understood that previous field activities have been conducted by the contractor on this facility. The contractor shall review existing site specific health and safety documents and modify the existing template to address site specific health and safety issues related to the specific tasks required under this Scope of Work.

11.2. The Contractor shall review the attached phase safety guideline examples prior to the development of the Accident Prevention portion of the SSHP. At a minimum, the hazard analysis and phase safety discussions shall reflect, in a task specific outline, those work efforts required in the task definition section of this Scope of Work.

11.3. The Contractor shall incorporate in the site specific portion of the contingency plan, any additional information, precautions, and countermeasures deemed necessary by the facility regarding chemical inventories in adjacent areas which could potentially impact site operations.

PHASE PLAN GUIDELINES

1. Definition of Phase. A phase is an operation involving a type of work which presents hazards not experienced in previous operations or where new subcontractors are performing the work. The three components, phase-hazard-action, are described in the attached sheets. These include:

a. Phase of Construction. This sample contains a list of phases and subphases that may require a separate phase safety plan. Obviously, all the phases listed will not be applicable to each project and some projects may involve phases not identified in this list.

b. Hazards. This sample contains a list of some of the typical hazards that might be encountered. These are examples only, and should not be copied. It is necessary to study the work involved and to identify the specific hazards that will be experienced at this work area, as the hazards will vary significantly between projects. As an example, hazards encountered on underground utilities at one project may differ substantially from the hazards found at another similar project because of differences in soil, depth of excavation, proximity of structures and building, and locations of other utilities.

c. Sample Phase-Hazard-Action Outline. This sample shows a possible format for a phase safety plan that might be submitted on a representative project. This sample incorporates phases of construction, the hazards that may be encountered, and preventive actions that will be taken to overcome these hazards. This example should not be copied as each phase or project should be analyzed on an individual basis.

2. Individuality. Phase plans developed for one project should not be copied for another as the hazards differ substantially. In addition, there may be a number of alternative ways of dealing with a particular hazard. Accordingly, the phase plan for the project at hand must list only the alternative or combination of alternatives that have been chosen after considering the factors involved.

3. Implementation and Instruction. Employees performing the work must be made aware of the plans. For this reason, an important part of any phase plan is a description of the specific instructions and precautions that will be given to the employees who will be performing the work.

SAMPLE NO. 1
EXAMPLES OF MAJOR/SUBCONSTRUCTION PHASES

Earthmoving, Land Clearing and Building Foundations

- Hand operations
- Equipment operations
- Pile-driving
- Basement excavations

Concrete Work

- Footings
- Forming
- Steel reinforcement
- Concrete placement
- Stripping
- Material Storage
- Finishing

General Building Construction

- Carpentry
- Masonry
- Floor, wall, brick cleaning
- Plastering
- Painting
- Floor coverings
- Roofing
- Misc. finishing phases

Electrical and Instrumentation

- Interior
- Aerial
- Underground
- Alarm and intercom

Demolition

Paving

Explosive and Blasting

Marine Operations

- Floating plant
- Dredging/excavations
- Diving
- Rock placement
- Piled-driving

Trenching and Excavations for Utilities

- Water
- Gas
- Sewer
- Communications cables

Steel Erection

- Delivery and storage
- Erection

Mechanical

- Heating, vent/air cond.
- Plumbing
- Sprinkler systems

Landscaping

- Grading
- Sodding/seeding
- Planting
- Rock placement

Quarrying

Tunneling

Cableway Operations

NOTE: This is not to be considered a complete list of phases of construction. Each project will require its own phase considerations.

SAMPLE NO. 2
EXAMPLES OF HAZARDS TO BE CONTROLLED

Falls

- Into excavations
- Into caissons
- From scaffolds
- From roofs
- From steelwork
- From forms
- From elevated floors
- Through floor openings
- Through wall openings

Cave-ins Caused by:

- Water
- Vibration - traffic, rail, road, and equipment
- Excavated material (spoil)
- Freezing/thawing
- Heavy Equipment
- Adjacent building foundations
- Existing utilities
- Gravel veins

Fire Associated with:

- Welding spatter
- Flammable liquids, vapors, and paints
- Flammable gases
- Improper storage of combustibles

Run Over by Equipment

Collisions Between Equipment

Equipment Rolling Over

Crane Overturning

Contact with Energized Powerlines

Drowning

Material Falling

Crushed Under Equipment

Tire Servicing

Improperly Stacked or Stored Materials

- Round poles
- Steel materials
- Irregularly shaped items

Electrocution or Shock

Health Hazards Associated with Chemicals and Caustics such as:

- Epoxies
- Cement dust
- Acids
- Solvents
- Unknowns

Health Hazards Associated with Toxic Vapors and Mists such as:

- Spray painting operations
- Paint thinners and dryers
- Solvents
- Adhesives
- Carbon monoxide
- Unknowns

Health Hazards Associated with Toxic Particles and Dusts such as:

- Sandblasting
- Masonry saws
- Dry wall taping (asbestos)

Health Hazards Associated with Noise such as:

- Jackhammer operations
- Sandblasting
- Masonry saw operations
- Grinding
- Crushers
- Woodworking equipment

Health Hazards Associated with Ionizing Radiation such as:

- Soil testing
- X-ray of welds

NOTE: This is not to be considered a complete list of hazards. Each project and each phase has its own peculiar hazards that must be controlled.

SAMPLE NO. 3

EXAMPLES OF A PHASE SAFETY PLAN FOR MASONRY CONTRACTORS

Contractor Name: James Masonry Contract No. 76-0000

Location: Jonesville Army Reserve Center, NE Date Prepared: 2 May 1977

Equipment to be used: Forklift, mortar mixer, metal tubular scaffold, masonry saw

Phase of Construction	Hazards to be Controlled	Action to be Taken to Overcome Hazards
Ground Level Masonry Activity	Equipment running over employee	(1. Backup alarms. (2. Barricade work areas. (3. Signalmen where required. (4. Brief drivers on proper and safe operations.
	Back injuries due to over-stretching or improper lifting of materials	(1. Stack materials at proper level and height. (2. Set up disposal bins.
	Tripping over materials or stepping on nails, etc.	(1. Clean up materials. (2. Set up disposal bins. (3. brief employees to discard into proper disposal containers.
	Materials being hoisted over employees' heads	(1. Brief crane operator to stay away from area.
Masonry Wall Construction	Employees falling from elevated structures; i.e., scaffold or floor	(1. Deck entire scaffold. (2. Install standard railing and toeboards on all open sides. (3. Install standard ladder and tie off for access. (4. Insure scaffolding is properly assembled. (5. Secure footings for scaffolds.

Sample No. 3 (Cont'd)

EXAMPLES OF A PHASE SAFETY PLAN FOR MASONRY CONTRACTORS

Phase of Construction	Hazards to be Controlled	Action to be Taken to Overcome Hazards
Masonry Wall Construction (Cont'd)	Tripping	(1. Clean up materials. (2. Set up disposal bins. (3. Brief employees to discard into proper disposal containers.
	Back injuries	(1. Stack materials at proper level and height. (2. Brief each employee on how to lift.
Cleanup and Other Masonry Supported Activities	Flying particles from brick saws chipping operations	(1. Safety goggles. (2. Proper guards on saws.
	Electrocution or Shock	(1. Grounded tools.
	Inhaling of toxic materials or handling of caustics or toxic materials	(1. Protective gloves, goggles, chemical masks, aprons, footwear.

NOTE: This is only an example of a phase safety plan and is not to be considered all inclusive. The plan must be developed for each job and each phase.

APPENDIX E
SITE SPECIFIC ADVANCED AGREEMENTS

(ENCLOSURE PENDING FINAL SCOPE OF WORK)

APPENDIX F
GEOLOGY INSTRUCTIONS

Naples Truck Stop, Vernal Utah 7 July 94

Final Ground Water Extraction Scope - Geological

1. **Purpose and Objectives** The purpose of this scope is to direct the design of the ground water extraction system to address the contaminant plume present in the subsurface. The objective of this system is to capture and treat the contaminants in their entirety to prevent further migration down gradient of the source. Further, it is planned to expedite the drawing of possible contaminants from underneath the Naples Truck Stop building in order to eliminate a source and reduce the potential hazards to the occupants of the structure.

1.2 **Features** The system will consist of a series of wells utilizing an enhanced vacuum extraction method to remove free product, dissolved phase, and vapor phase constituents from the subsurface in a single waste stream, and a treatment process to separate the contaminants from the waste stream; the treatment process will be addressed elsewhere. Particular performance criteria include:

1.2.1 Protecting the Questar Pipeline building from vapor infiltration

1.2.2 Ensuring that the leading edge of the plume is effectively prevented from further migration

1.2.3 Ensuring that significant isolated "pockets" of contamination do not remain in the subsurface due to inadequate plume capture or alteration of the assumed flow vectors

1.3 **Design Assumptions** The following assumptions may be made concerning the conditions at the site:

1.3.1 Ground water levels are reported to fluctuate appreciably during different times of the year, predominantly the result of regional irrigation during the spring and summer. When this occurs it has the effect of smearing contaminants in the vadose zone during water level fall, and allowing further dissolving into the water during level rise.

1.3.2 The natural ground water gradient at the site (previously calculated to be 0.016 to the southeast) will prevent any significant drawback from the down gradient side of wells; this will be critical to keep in mind when locating wells to intercept the leading edge of the plume. Symmetrical zones of influence cannot be assumed.

1.3.3 The leading edge of the plume will continue to migrate during the design phase, it should be anticipated where it will be when the extraction wells are installed and brought on line.

1.3.4 Pumping wells may influence the flow vectors of both ground water and contaminants.

1.4 Recommendations Following are recommendations for the design and operation of the extraction system.

1.4.1 In order to allow the shortest pipe runs it is suggested that the two pumps be set up to operate independently, one being connected to the north and west wells, the other to the south and east ones. It would be desireable to have a connection between the two sets in the event that one of the pumps goes down. If that were the case, selected critical wells could still be operated while the ancillary ones are shut off until repairs are made.

1.4.2 Two wells should be installed near the Naples Truckstop building, on the down gradient side, to draw any remaining contaminants from the area and collapse the plume laterally.

1.4.3 Wells should be installed as deep as practical in order to produce the greatest drawdown possible.

1.4.4 The number of wells should be kept as low as possible while still providing an effective capture system. This will allow greater vacuum to be applied to each without having to choke off several wells to provide adequate stress in one area.

1.4.5 A limited investigation and characterization of the area in the northeast corner of the Naples Truckstop property ("stained soil") shall be undertaken. This investigation shall consist of two borings utilizing continuous sampling to characterized the materials from the ground surface to the water table. The objective of the investigation is to determine if any contaminants are present at the site which may interfere with the treatment system, and whether there is evidence that the contaminants, if present, have a means of being transported to the extraction system (i.e. have any contaminants reached the ground water). A visual inspection of the material shall be made throughout the depth of the borings noting evidence of contamination (product, discoloration, odor). A minimum of three depths shall be sampled for contamination; it is recommended that samples be taken from immediately below the ground surface to characterize the constituents present, a second immediately above the water table to determine if migration has reached that level, and a third at mid depth in the column.

1.4.6 Vadose zone monitoring points should be installed at several locations to monitor soil vapor concentrations.

1.5 Submittal Requirements The following items will be required from the Contractor.

1.5.1 A general geological cross-section showing the significant stratigraphic units present at the site.

1.5.2 A scaled site map showing the location of all extraction wells, monitoring wells, piping between the wells and treatment

plant, all valves, the outline of the contaminant plume based on the anticipated migration, and the major existing structures (buildings, roads, pavement edges).

1.5.3 A table indicating the installed depths of all wells, screened intervals, elevation of the top of casing, and if determined, the static water level and the date the level was recorded.

1.5.4 A narrative outlining the rational for well locations and what each is intended to address.

1.5.5 When the system is fully functioning and has reached static conditions, water levels shall be taken in all monitoring wells. These readings shall be compared to levels recorded prior to the start of pumping to determine the influence on the aquifer. This information shall be used to prepare a scaled map showing the projected zones of influence from each extraction well.

1.5.6 Logs of all wells installed at the site including materials descriptions and diagrams of well construction.

1.5.7 Boring logs, descriptions, and contaminant test results of the "stained soil" area in the northeast corner of the truckstop property.

2.0 **Extraction and Monitoring Wells** Additional monitoring and extraction wells shall be installed at the site to more effectively capture the contaminants.

2.1 **Features** The extraction and monitoring wells shall be so constructed as to allow conversion from one type to the other in the event that it becomes necessary. Thus similar installation procedures and materials shall be used.

2.1.1 The installed depth shall be not less than 15 feet below ground surface.

2.1.2 Screening shall start above the anticipated high water level in order to detect floating product during static conditions. This is particularly critical of down gradient monitoring wells which will experience little or no drawdown during system operation.

2.1.3 Casing shall be 4 inch diameter Schedule 40 PVC flush jointed tubing with continuous slot screening and an end cap on the bottom of the casing.

2.1.4 A sand filter pack shall be installed to completely fill the annular space from the base of the hole to at least one foot above the screened interval. Filter pack sand shall be tremied as the drill casing is pulled from the hole.

2.1.5 A bentonite seal shall be installed immediately above the filter pack to within a minimum of 1 foot of the surface. The seal

shall consist of sodium bentonite pellets or chips and be installed completely around the annulus of the well.

2.1.6 A steel, flush mounted collar and lid shall be installed to protect the wells. The lid shall have provisions for securing it to the collar by means of bolts or a lock. Monitoring well casings shall be sealed with a slotted, tight fitting cap.

2.1.7 All wells shall be developed by surging the casing and bailing at least three well volumes to remove any entered silt and draw formational water toward the screen.

2.1.8 Extraction wells shall be fitted with a clear plexiglass sight tube at the well head to observe formational water and ensure proper functioning of the system.

2.1.9 Extraction well heads shall be fitted with a valve to regulate the applied vacuum in order to balance the system for optimum performance.

APPENDIX G
OPERATIONS AND MAINTENANCE GUIDELINES

(SUPPLIED TO CONTRACTOR AT 04 MAY MEETING)

APPENDIX H
PROJECT FORMS

RAPID RESPONSE QUALITY CONTROL DAILY REPORT

_____
(CONTRACTOR'S NAME)

_____
(CONTRACT NUMBER)

_____
(SITE NAME AND LOCATION)

REPORT NO.____ DELIVERY ORDER NO._____ DATE_____
WEATHER_____ RAINFALL_____INCHES TEMP: MIN._____ MAX._____

INSTRUCTIONS: THE CONTRACTOR SHALL SUBMIT THIS FORM DAILY AT THE CLOSE OF BUSINESS TO THE ON-SITE CORPS REPRESENTATIVE. CONCURRENTLY, THE CONTRACTOR SHALL PROVIDE ELECTRONIC ACCESS TO THE COMPLETED FORMS TO THE CORPS DISTRICT OFFICE AND THE AREA OFFICE.

1. WORK PERFORMED TODAY BY PRIMARY CONTRACTOR ON-SITE AND/OR OFF-SITE (INCLUDING A COMPLETE DESCRIPTION):_____

2. WORK PERFORMED BY SUBCONTRACTORS ON-SITE AND/OR OFF-SITE (INCLUDE A COMPLETE DESCRIPTION):_____

3. COMPLETE AND ATTACH THE DAILY PERSONNEL COST REPORT AT THE END OF THIS DOCUMENT AND LABEL AS APPENDIX 1.

THE DAILY PERSONNEL COST REPORT IS REQUIRED FOR ALL COST REIMBURSABLE WORK ON-SITE AND OFF-SITE INCLUDING SUBCONTRACTORS. AT A MINIMUM, THE COST REPORT SHALL PROVIDE: REPORT TITLE, SITE NAME, CONTRACTOR, CONTRACT NUMBER, DELIVERY ORDER NUMBER, DATE, EMPLOYEE NAME AND CLASSIFICATION, HOURLY LABOR RATES (REGULAR, OVERTIME OR OTHER), TOTAL HOURS (REGULAR, OVERTIME OR OTHER) AND PER DIEM. LABOR COSTS SHALL BE SUMMED FOR: EACH EMPLOYEE, THE ENTIRE DAILY REPORT, THE ENTIRE DELIVERY ORDER (UP TO THE DATE OF THE REPORT) AND THE PERCENTAGE OF THE ESTIMATED COST OF LABOR.

4. ON-SITE CONDITIONS WHICH RESULTED IN DELAYED PROGRESS:_____

5. TYPE AND RESULTS ON INSPECTIONS: (INDICATE WHETHER: P-PREPARATORY, I-INITIAL, OR F-FOLLOWUP AND INCLUDE SATISFACTORY WORK COMPLETED OR DEFICIENCIES WITH ACTION TO BE TAKEN):

6. LIST TYPE AND LOCATION OF TESTS PERFORMED AND RESULTS:

7. LIST VERBAL INSTRUCTIONS RECEIVED FROM GOVERNMENT PERSONNEL ON ANY DEFICIENCIES OR RETESTING REQUIRED:

8. COMPLETE AND ATTACH THE DAILY EQUIPMENT COST REPORT AT THE END OF THIS DOCUMENT AND LABEL AS APPENDIX 2. THE DAILY EQUIPMENT COST REPORT IS REQUIRED FOR ALL COST REIMBURSABLE WORK ON-SITE AND OFF-SITE INCLUDING SUBCONTRACTORS. AT A MINIMUM, THE COST REPORT SHALL PROVIDE: REPORT TITLE, SITE NAME, CONTRACTOR, CONTRACT NUMBER, DELIVERY ORDER NUMBER, DATE, EQUIPMENT TYPE AND IDENTIFICATION NUMBER, HOURS IN SERVICE, HOURS STANDBY, HOURS IDLE TIME, COST RATE, AND DAYS IN SERVICE. EQUIPMENT COSTS SHALL BE SUMMED FOR: EACH TYPE, THE ENTIRE DAILY EFFORT, THE ENTIRE DELIVERY ORDER (UP TO THE DATE OF THE REPORT) AND THE PERCENTAGE OF THE ESTIMATED COST OF EQUIPMENT.

9. LIST THE TOTAL NUMBER OF SAMPLES COLLECTED AND TESTED FOR THE DAY:
COLLECTED:_____ TESTED:_____ AMPLIFYING INFO._____
_____
_____
_____
_____
_____

10. LIST THE TOTAL QUANTITY OF WASTEWATER TREATED: _____ GALLON(S)

11. LIST THE TOTAL NUMBER OF DRUMS OVERPACKED:

QUANTITY	LOCATION	HAZ-CAT
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

12. LIST THE TOTAL AMOUNT OF WASTE(S) REMOVED FROM THE SITE:

LIQUID: _____BBL/GAL SOLIDS: _____YDS/TONS

AMPLIFYING INFO:_____
_____
_____
_____

13. LIST THE FOLLOWING TRANSPORTATION AND/OR DISPOSAL INFORMATION:

QUANTITY	I.D. NO.	MATERIAL	MANIFEST NO.	DISPOSAL LOCATION

14. COMPLETE AND ATTACH THE DAILY MATERIAL COST REPORT AT THE END OF THIS DOCUMENT AND LABEL AS APPENDIX 3. THE DAILY MATERIAL COST REPORT IS REQUIRED FOR ALL COST REIMBURSABLE WORK ON-SITE AND OFF-SITE INCLUDING SUBCONTRACTORS. AT A MINIMUM, THE COST REPORT SHALL PROVIDE: REPORT TITLE, SITE NAME, CONTRACTOR, CONTRACT NUMBER, DELIVERY ORDER NUMBER, DATE, MATERIAL PURCHASED, QUANTITY AND UNITS, LOCATION OF MATERIAL, AND VENDOR. MATERIAL COSTS SHALL BE SUMMED FOR: EACH PURCHASE, THE ENTIRE DAILY EFFORT, THE ENTIRE DELIVERY ORDER (UP TO THE DATE OF THE REPORT) AND THE PERCENTAGE OF THE ESTIMATED COST OF MATERIALS.

15. LIST ALL SAFETY VIOLATIONS OBSERVED AND CORRECTIVE ACTIONS:

16. LIST ANY CREDITS AND/OR ADJUSTMENTS DUE TO THE GOVERNMENT (REFERENCE INVOICE NUMBER, CONVERSATIONS, ETC.).

17. COMPLETE AND ATTACH THE RAPID RESPONSE DAILY WORK ORDER AT THE END OF THIS DOCUMENT AND LABEL AS APPENDIX 4. THE DAILY WORK ORDER IS REQUIRED FOR ALL COST REIMBURSABLE WORK ON-SITE AND/OR OFF-SITE INCLUDING SUBCONTRACTORS. THIS DOCUMENT DETAILS THE CONTRACTORS NEXT DAY WORK EFFORT WHICH SHALL HAVE ADVANCE APPROVAL BY THE ON-SITE CORPS REPRESENTATIVE BEFORE THE CONTRACTOR IS ENTITLED TO COST REIMBURSEMENT.

18. ADDITIONAL COMMENTS/REMARKS:_____

19. CERTIFICATION: I CERTIFY THAT THE ABOVE REPORT IS COMPLETE AND CORRECT AND THAT I, OR MY AUTHORIZED REPRESENTATIVE, HAVE INSPECTED ALL WORK PERFORMED THIS DAY BY THE PRIMARY CONTRACTOR AND EACH SUBCONTRACTOR AND HAVE DETERMINED THAT ALL MATERIALS, EQUIPMENT, AND WORKMANSHIP ARE IN STRICT COMPLIANCE WITH THE PLANS AND SPECIFICATIONS, EXCEPT AS NOTED ABOVE.

_____
CONTRACTORS DESIGNATED
QUALITY CONTROL REPRESENTATIVE

RAPID RESPONSE DAILY WORK ORDER

_____

(PRIMARY CONTRACTOR'S NAME)

_____

(CONTRACT NUMBER)

_____

(SITE NAME AND LOCATION)

REPORT NO.____ DELIVERY ORDER NO._____ DATE_____

SUBCONTRACTOR(S):

_____

_____

_____

GOVERNMENT AGENCIES ON-SCENE:

_____

_____

_____

INSTRUCTIONS: THE CONTRACTOR SHALL BE ATTACHED TO THE RAPID RESPONSE QUALITY CONTROL DAILY REPORT AND SHALL BE SUBMITTED DAILY AT THE CLOSE OF BUSINESS TO THE ON-SITE CORPS REPRESENTATIVE. CONCURRENTLY, THE CONTRACTOR SHALL PROVIDE ELECTRONIC ACCESS TO THE COMPLETED FORMS TO THE CORPS DISTRICT OFFICE AND THE AREA OFFICE.

1. DESCRIPTION OF WORK TO BE PERFORMED BY CONTRACTOR(S), WITH AN ESTIMATE OF THE PERCENTAGE TO BE COMPLETED:_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

2. NUMBER OF PERSONNEL AUTHORIZED TO PERFORM WORK ON-SITE AND OFF-SITE.

SUPERVISORS	_____	FOREMAN	_____
ENGINEERS	_____	CHEMIST	_____
GEOLOGIST	_____	SAFETY	_____
EMT	_____	TECHS	_____
LABORERS	_____	OPERATORS	_____

OTHERS (SPECIFY):

_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

3. EQUIPMENT AND EXPENDABLE MATERIALS AUTHORIZED:

ITEM	QUANTITY	DURATION	ITEM	QUANTITY	DURATION

4. TEST AND/OR INSPECTIONS TO BE PERFORMED (INDICATE TYPE AND LOCATION): _____

5. ADDITIONAL COMMENTS/REMARKS: _____

6. CERTIFICATION: I CERTIFY THAT THE ABOVE WORK IS ORDERED AND AUTHORIZED BY THE ON-SITE CORPS REPRESENTATIVE IN THE PERFORMANCE OF THE ABOVE CITED CONTRACT.

_____
ON-SITE CORPS REPRESENTATIVE

7. I ACKNOWLEDGE RECEIPT OF THIS WORK ORDER AND UNDERSTAND THAT ANY MODIFICATION TO THE WORK ORDER MUST BE IN WRITING AND APPROVED BY THE PROJECT MANAGER.

_____
CONTRACTOR'S REPRESENTATIVE

8. WORK ORDER AMENDMENTS AND MODIFICATIONS (INCLUDE TIME, DESCRIPTION, AND AUTHORIZING PERSON): _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

ON-SITE CORPS REPRESENTATIVE

CONTRACTOR'S REPRESENTATIVE

TRANSPORTATION AND DISPOSAL TRACKING FORM

1 WASTE STREAM 2 DISPOSAL FACILITY	3 - WPS a. To COE b. Number c. COE Approval d. To TSDF	4 - TSDF APPROVAL 5 - P.O.#	6 - MANIFEST a. To COE b. Number c. COE Approval	7 - PICKUP a. Scheduled b. Actual c. Acceptance	8 TSDF RECEIVED MANIFEST	9 NO. OF DAYS	10 DATE MANIFEST TO CLIENT	11 DATE EXCEPTION RPT FILED	12 - SUBTITLE D FACILITY a. Yes/No b. If Yes, Date Documentation Received
	a. b. c. d.		a. b. c.	a. b. c.					a. b.
	a. b. c. d.		a. b. c.	a. b. c.					a. b.
	a. b. c. d.		a. b. c.	a. b. c.					a. b.
	a. b. c. d.		a. b. c.	a. b. c.					a. b.
	a. b. c. d.		a. b. c.	a. b. c.					a. b.
	a. b. c. d.		a. b. c.	a. b. c.					a. b.
	a. b. c. d.		a. b. c.	a. b. c.					a. b.
	a. b. c. d.		a. b. c.	a. b. c.					a. b.

WPS = WASTE PROFILE SHEET

COE = CORPS OF ENGINEERS

TSDF = TRANSPORTATION & STORAGE DISPOSAL FACILITY

P.O. = PURCHASE ORDER

APPENDIX I
MEETING MINUTES (MAY 4, 1994)

NAPLES TRUCK STOP
MAY 4, 1994

MEETING MINUTES

Attendees:	Larry Leahy, USACE	402-221-7770
	Greg Wagner, USACE	402-291-4260
	Tom Mathison, IT Corp	412-372-7701
	Steve Dineen, IT Corp	412-372-7701
	Gordon Lewis, USACE	402-221-4306
	Will Bonneau, USACE	402-221-7761
	Mike Sullivan, EPA-TAT	303-757-4984
	Mark Wichman, USACE	402-221-3826
	Dean Robb, IT Corp	303-793-5200
	Dave Cochran, IT Corp	412-372-7701
	Rand Webb, Richards Labs	801-785-2500
	Dean Richards, Richards Labs	801-785-2500
	Robert Richards, Richards Labs	801-785-2500
	Jim Richards, Richards Labs	801-785-2500
	Hays Griswald, EPA	303-294-7081

PURPOSE

The purpose of the meeting was to discuss the overall status of the immediate action to date and to outline the future scope of work for the project.

HIGHLIGHTS

- A background discussion of the project was conducted by TAT and Richards Lab. Each described the activities leading up to the immediate action request of the EPA.

- The interim action activities were described by D. Cochran of IT Corp. These include the installation of the monitoring and recovery wells, the placement of the enhanced soil vapor extraction unit (ESVE), and the set-up of the air stripping unit.

- The interim action has been essentially satisfied and it is now time to definitize the scope for the remainder of the project.

- To assist in the final definition of the limits of the plume, additional information was requested. These include:

  - Obtaining a copy of the Initial Abatement Site Characterization report submitted to the Utah DNR. Larry Leahy to locate and provide to IT.

- Obtain any well logs, well construction diagrams, and any analytical available for any of the wells installed pertaining to this project. TAT to locate what they have available and forward to IT.

- The scope to provide for the additional information required including additional monitoring wells and vapor points, conducting of slug tests in certain wells and any analytical requirements.

BIOREMEDIATION ACTIVITIES

- Richards Labs in process of conducting initial test of system. The final operation will include the placement of a 12,000 gallon AST to be used as a preliminary treatment unit and will include the air stream from the ESVE unit.

- A Standard Operating Procedure (SOP) manual was requested of Richards by the end of May.

- Concerns were raised as to the effectiveness of the initial test due to the absence of the contaminated air stream and also the levels of fumes within the building. These will both be addressed when the complete system is on line.

- Richards requested to know the levels of oxygen in the water and air streams.

- A monitoring and maintenance plan must be developed for the interim system operation. This may need to be in effect for up to five months.

FINAL SCOPE DEFINITION

The following items were discussed and will be included in the final scope for the project:

- The quantity and location of any additional monitoring/recovery wells.

- The quantity and location of any vapor monitoring points.

- Well construction materials and size requirements.

- The location and requirements for another ESVE unit. Also the requirements for a building in which to house the units.

- Any additional asphalt work which may be necessary.

- The possibility of the need to replace the potable water line along 1620 East. The local utility company will replace if required but the project would have to fund the installation.

- Further characterization of the Naples Truck Stop property with regard to other contaminants present which may effect the current remediation effort.

- Permit Requirements - It will be necessary the keep the State of Utah informed of the discharge levels and to run TPH analysis once per week for the City of Vernal.

- Investigate the possibility to install recharge galleries around the plume and the associated costs involved.

- Prepare an operation and maintenance manual for the ESVE system and the bioremediation system and provide the training necessary to operate each. A guideline for the preparation of the manual was provided to IT.

IMMEDIATE ACTIONS WHICH ARE REQUIRED TO BE ADDRESSED

- Arrange for a complete survey of the site to be completed including all the necessary well information.

- Proceed with the procurement of an electric pump to replace the existing diesel powered unit.

The meeting was adjourned with the tentative schedule set for the USACE to provide the scope of services to IT within approximately two weeks and the cost proposal and work plans to be due back to the USACE approximately three weeks thereafter.

Prepared by: Thomas P. Mathison
Project Manager
IT Corporation

Distribution

Larry Leahy, USACE
Greg Wagner, USACE
Tom Mathison, IT Corp
Steve Dineen, IT Corp
Gordon Lewis, USACE
Will Bonneau, USACE
Mike Sullivan, EPA-TAT
Mark Wichman, USACE
Dean Robb, IT Corp
Dave Cochran, IT Corp
Rand Webb, Richards Lab
Dean Richards, Richards Lab
Robert Richards, Richards Lab
Jim Richards, Richards Lab
Hays Griswald, EPA

APPENDIX J
DAVIS-BACON WAGE RATES

General Decision Number UT940028

Superseded General Decision No. UT930028

State: Utah

Construction Type:
Highway

County(ies):

DAGGETT	UINTAH
DUCHESNE	WASATCH

HIGHWAY CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	02/11/1994

COUNTY(ies):

DAGGETT	UINTAH
DUCHESNE	WASATCH

ENGI9993B 07/01/1990

	Rates	Fringes
POWER EQUIPMENT OPERATORS:		
Blade, rough	19.50	8.03
Blade smooth/finish	19.50	8.03
Bulldozer, over D7	18.60	8.03
Bulldozer, up to and including D7	17.70	8.03
Crusher	18.60	8.03
Grade setter	17.70	8.03
Heavy duty repairman	18.60	8.03
Loader over 10 cy	19.50	8.03
Lube engineer	17.70	8.03
Rotary Drill	17.70	8.03
Scraper under 35 cy	19.50	8.03

IRON0027C 08/01/1993

	Rates	Fringes
IRONWORKERS:		
Ornamental, Structural, and Reinforcing	17.65	4.31

SUUT3004A 03/24/1992

	Rates	Fringes
BRICKLAYER/STONEMASON	15.65	1.57
CARPENTERS	16.99	2.51
CEMENT MASONS	14.24	2.41
ELECTRICIANS	16.88	4.44
FLAGGERS	6.64	1.62
LABORERS:		
General Laborer	12.27	2.58
Asphalt Raker Laborer	12.40	2.38
Laborer Fence Erector	12.82	2.62
Landscape Laborer	12.27	2.79
Pipelayer (smooths sides and bottom of trenches, does rigging of pipe, assemble and install concrete and tile pipe)	12.82	2.70
Laborer, Power Tools Cutting Torch, Operators of gasoline, electric or pneumatic tools, (E.G. compressor, compactor, jackhammer, vibrator, concrete saw, chain saw, and concrete cutting torch)	13.11	2.67
Laborer, Powderman	13.07	2.71

PAINTERS:		
Spray	14.05	1.62
Sandblaster (all surfaces that will be repainted except highway striping)	14.05	1.62
POWER EQUIPMENT OPERATORS:		
Assistant to Engineer	16.76	5.85
Backhoe/Loader Comb	18.05	7.08
Backhoe, Tire & Track, under 5 cu. yds.	17.95	6.89
Backhoe, Tire & Track, over 5 cu. yds.	18.95	6.93
Compactor	18.20	6.93
Concrete Pump Operator	15.63	6.93
Cranes - up to 45 tons	18.05	7.23
Cranes - over 45 tons	18.36	6.73
Loader under 2 1/2 cu. yd.	17.53	7.19
Loader 2 1/2 to 10 cu. yd.	15.58	5.78
Paver, Asphalt/Concrete	15.83	7.23
Pile Driver	23.46	3.56
Plant Operator Asphalt/Concrete	14.66	4.34
Roller, Asphalt	17.15	5.47
Roller Grader	14.36	5.57
Scraper over 35 cu. yd.	18.95	7.23
Screedman	16.51	6.10
Sheepsfoot compactor	16.29	6.93
Sweeper	9.79	1.27
Tractor, Small rubber tire	17.15	7.23
TRUCK DRIVERS:		
Dump Trucks - Water Level Capacity (Bottom, end and side), including dumpster truck, turnawagons, turnarockers and dumpcrete):		
Less than 8 cu. yds.	17.06	5.87
8 cu. yds. and less than 14 cu. yds.	15.99	5.72
14 cu yds. and less than 35 cu. yds.	16.14	5.72
35 cu. yds. and less than 75 cu. yds.	16.34	5.72
Water, Fuel and Oil Trucks		
2500 gallons to less than 4000 gallons	15.45	5.06
6000 gallons to less than 10,000 gallons	16.54	5.72
Pickup	15.99	5.32
Transport Truck	17.00	4.54
Truck Mechanic	16.84	5.72

TEAM0222G 07/01/1990

	Rates	Fringes
TRUCK DRIVERS:		
Dump Trucks - Water Level Capacity (Bottom, End and Side), Including Dumpster Truck, Turnawagons, Turnarockers and Dumpcrete):		
14 cu. yds. and less than 35 cu. yds., double	16.69	6.52

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

TEAM2220A 07/01/1990

	Rates	Fringes
TRUCK DRIVERS		
Water, Fuel and Oil:		
Up to 2500 gallons	16.39	6.52
4,000 gallons to less than 6,000 gallons	16.84	6.52
Over 10,000 gallons	17.34	6.52
Oiler Spreader Operator where boot man is not required	17.09	6.52

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR 5.5(a) 1(ii)).

END OF GENERAL DECISION

APPENDIX K
SALES TAX USE INFORMATION

CEMRO-OC/Viles/3820 9 June 1994

MEMORANDUM FOR CEMRO-ED-ER, ATTN: Larry Leahy

SUBJECT: Rapid Response, Utah Sales and Use Tax

1. Please refer to your memorandum dated 06 June 1994 regarding a Rapid Response Project at Naples Truck Stop, Vernal, UT.

2. According to the Utah State Department of Revenue, the state sales and use tax rate is 5 percent. For a project located at Vernal, a local tax of 1 percent is also applicable. Therefore, the total tax rate for a project at Vernal is six (6) percent.

4. No special exemptions exist for Federally-funded environmental projects and there is no provision for the return of sales and use taxes to the Federal Government for environmental projects.

ANN L. WRIGHT
Senior Assistant District Counsel

APPENDIX L
ASPHALT/TRENCHING SPECIFICATIONS

SECTION 02552

AGGREGATE BASE COURSE,
AND BITUMINOUS SURFACE COURSE

INDEX

ZERO ACCIDENTS

SECTION 02552
AGGREGATE BASE COURSE,
AND BITUMINOUS SURFACE COURSE

PART 1. GENERAL

1.1. SUMMARY. (NOT APPLICABLE)

1.2. REFERENCES. The publications listed below forms a part of this specification to the extent referenced. The publications are referred to in text by the basic designation only.

DEPARTMENT OF TRANSPORTATION, CONSTRUCTION DIVISION, STATE OF UTAH (UDOT). Standard Specifications for Road and Bridge Construction, 1992 Edition

1.3. SUBMITTALS. Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01300 SUBMITTAL DESCRIPTIONS:

SD-09 Reports

Aggregate Job-mix Gradation\; *FIO*\
Asphalt Cement Job-mix Formula\; *FIO*\
Certified Refinery Analysis\; *FIO*\
*Base Course Aggregate; *FIO*\
Moisture-Density Relationships\; *FIO*\

PART 2. PRODUCTS

2.1. (NOT APPLICABLE)

PART 3. EXECUTION

3.1. MODIFICATION TO THE UDOT. References to "Engineer" and "Department" in the UDOT shall mean the Contracting Officer or Representative. Paragraph 402.3.14 "Sampling and Testing" shall not apply with the exception of subparagraph 402.3.14.2 "Density" which shall apply. In addition, Section 402.4 "METHOD OF MEASUREMENT" and Section 402.5 "BASIS OF PAYMENT" shall not apply.

3.2. PAVEMENT REPLACEMENT. The replaced pavement materials shall be consist of bituminous surface course, and aggregate base course placed to the lines and grades of the existing pavement as shown on the drawings. Replacement pavement and new pavement materials shall conform to the requirements within this specification.

3.3. BITUMINOUS SURFACE COURSE (CENTRAL PLANT HOT MIX). Bituminous surface course shall be placed to and conform to the requirements specified in the UDOT, Section 402, "ASPHALT CONCRETE PAVEMENT (DENSE-GRADED)". The aggregate shall

meet the gradation specified in Table 402-1, number 1,2,3 or 4. The Contractor shall submit the *aggregate Job-mix gradation*\ showing the material conforms to the requirements of the UDOT. In addition, the Contractor shall develope and submit the asphalt cement *Job-mix formula*\.

3.4. BITUMINOUS MATERIALS

3.4.1. ASPHALT CEMENT. Asphalt cement conform to the requirements specified in Section 704, "ASPHALT MATERIAL" of the UDOT. The asphalt cement shall be penetration grade 85-100 or viscosity Grade AC-10. *Certified refinery analysis*\ shall be submitted by the Contractor showing that the material conforms to the requirements of the UDOT.

3.5. AGGREGATE BASE COURSE. The aggregate base course shall conform to, and be placed in accordance with, the requirements specified in Section 301, "UNTREATED BASE COURSE" of the UDOT. The aggregate base course shall meet the gradation specified in Table 301-1, 3/4-inch or 1-inch max.. The Contractor shall submit the *base course aggregate*\ gradation showing that the material conforms to the requirements of UDOT. The aggregate base course shall be compacted to 100 percent of laboratory maximum density. The laboratory maximum density shall be determined in accordance with ASTM D 1557, Method D or AASHTO T 180, Method D. The Contractor shall submit the *moisture-density relationships*\ used to determine the laboratory maximum density.

SECTION 02222

EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS

INDEX

SECTION 02222

EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 422	(1963; R 1990) Particle-Size Analysis of Soils
ASTM D 1556	(1990) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(1991) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu. m.))
ASTM D 2167	(1984; R 1990) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2487	(1990) Classification of Soils for Engineering Purposes
ASTM D 2922	(1991) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(1988) Water in Industrial Stds & Engr Data Content of Soil and Rock In Place by Nuclear Methods (Shallow Depth)

1.2 NOT USED

1.3 DEFINITIONS

1.3.1 Degree of Compaction

Degree of compaction shall be expressed as a percentage of the maximum density obtained by the test procedure presented in Method D ASTM D 1557.

1.4 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01300 SUBMITTAL DESCRIPTIONS.

SD-09 Reports\

Disposal Facility\; *FIO*\.

Location of disposal facility and appropriate documentation.

Field Density Tests\; *FIO*\

Testing of Backfill Materials\; *FIO*\

Copies of all laboratory and field test reports within 24 hours of the completion of the test.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Suitable Materials

Suitable materials are materials that classify according to ASTM D 2487 as GW, GP, GM, GC, SW, SP, SM, SC, CL, CH, and ML. Lime and flyash shall also be considered as suitable materials when used as stabilizing agents.

2.1.2 Unsuitable Materials

Unsuitable materials include all materials that are not defined above as suitable materials. In addition, unsuitable materials are materials that classify according to ASTM D 2487 as MH, Pt, OH, SP, and OL. Unsuitable materials also include all material that contains debris, refuse, roots, organic matter, frozen material, fine-grained sedimentary rocks (ie. shale, claystone, siltstone, mudstone, and marl) even though they may be intensely weathered, contamination from hazardous, toxic, biological or radiological substances, stones larger than 3 inches in any dimension, or other materials that are determined by the Contracting Officer as unsuitable for providing a stable subgrade or stable foundation for structures. Otherwise suitable material which has excess moisture content shall not be classified as unsuitable material unless it cannot be dried by manipulation, aeration, or blending with other materials as determined by the Contracting Officer.

2.1.3 Cohesionless and Cohesive Materials

Cohesionless materials shall include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, CL, ML, CH, and MH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic.

2.1.4 Unyielding Material

Unyielding material shall consist of rock and gravelly soils with stones greater than 3 inches in any dimension.

2.2 EQUIPMENT

2.2.1 Dewatering

The Contractor shall provide and maintain adequate dewatering equipment to remove and dispose of all surface and ground water entering excavations, trenches, or other parts of the work.

PART 3 EXECUTION

3.1 DEWATERING

Each excavation shall be kept dry during subgrade preparation and continually thereafter until suitable backfill is placed and compacted as specified herein to the extent that no damage from hydrostatic pressure, flotation, or other cause will result. All excavations for trenches which extend down to or below ground water shall be dewatered by lowering and keeping the ground water level beneath such excavations 12 inches or more below the bottom of the excavation. Surface water shall be diverted or otherwise prevented from entering excavated areas or trenches to the greatest extent practicable without causing damage to adjacent property. Existing drainage facilities may be used for disposal of surface and ground water during dewatering operations subject to prior approval of the Contracting Officer. The Contractor shall be responsible for all damages incurred to the drainage facilities as a result of the dewatering operations. All pipe or conduits shall be left clean and free of sediment.

3.2 BACKFILLING AND COMPACTION

Backfill material shall consist of suitable material as required. Backfill shall be placed in layers not exceeding 6 inches loose thickness for compaction by hand operated machine compactors, and 8 inches loose thickness for other than hand operated machines, unless otherwise specified. Each layer shall be compacted to at least 95 percent maximum density for cohesionless soils and 90 percent maximum density for cohesive soils, unless otherwise specified. Expansive cohesive soils shall be at a moisture content between 3 and 8 percent above optimum moisture when compacted. Non-expansive cohesive soil shall be at a moisture content between -1 and +3 percent of optimum moisture when compacted. Cohesionless soils shall be compacted at a moisture content as required to facilitate compaction without bulking. Each layer shall be compacted to not less than the percentage of laboratory maximum density specified below:

	Percentage Laboratory Maximum Density	
	Cohesive Material	Cohesionless Material
Fill, embankment, and backfill		
In utility trenches		
Beneath paved areas	90	95
Expansive soils Compacted to not less than 85 percent nor more than 90 percent		

3.2.1 Replacement of Unyielding Material

Unyielding material removed from the trench or excavation shall be replaced with suitable material.

3.2.2 Replacement of Unsuitable Material

Unsuitable material removed from the trench or excavation shall be replaced with suitable material.

3.3 TESTING

Testing shall be the responsibility of the Contractor and shall be performed at no additional cost to the Government.

3.3.1 Testing Facilities

Tests shall be performed by an approved commercial testing laboratory or may be tested by facilities furnished by the Contractor. No work requiring testing will be permitted until the facilities have been approved by the Contracting Officer.

3.3.2 *Testing of Backfill Materials*\

Characteristics of backfill materials shall be determined in accordance with particle size analysis of soils ASTM D 422 and moisture-density relations of soils ASTM D 1557. A minimum of one particle size analysis and one moisture-density relation test shall be performed on each different type of material used for bedding and backfill.

3.3.3 *Field Density Tests*\

Density tests shall be performed by an approved commercial testing laboratory or may be tested by facilities furnished by the Contractor which are approved by the Contracting Officer. Tests shall be performed in sufficient numbers to ensure that the specified density is being obtained for each lift. One test shall be made for each 200 linear feet or less for each layer of specified depth, except areas to receive pavements, for which one test shall be made for

each 100 linear feet or less for each layer of specified depth. Laboratory tests for moisture-density relations shall be determined in accordance with ASTM D 1557, Method B, C, or D. A mechanical tamper may be used, provided the results are correlated with those obtained by the referenced hand tamper. Field in-place density shall be determined in accordance with ASTM D 1556, ASTM D 2167, or ASTM D 2922. When ASTM D 2922 is used, the calibration curves shall be checked and adjusted using only the sand cone method as described in paragraph "Calibration" of ASTM D 2922. ASTM D 2922 results in a wet unit weight of soil and when using this method, ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gages shall be checked along with density calibration checks as described in ASTM D 3017. The calibration checks of both the density and moisture gages shall be made at the beginning of a job, on each different type of material encountered, at intervals as directed by the Contracting Officer. If ASTM D 2922 is used for field density control, there should be at least one test performed according to ASTM D 1556 per every ten tests performed according to ASTM D 2922 for correlation of test results. Copies of calibration curves and results of calibration tests shall be furnished to the Contracting Officer within 24 hours of conclusion of the tests. Trenches improperly compacted shall be reopened to the depth directed, then refilled and compacted to the density specified at no additional cost to the Government.

APPENDIX M
PHASE I INTERIM ACTION REPORT

INTERIM PRODUCT COLLECTION AND TREATMENT SYSTEM
SUMMARY REPORT
NAPLES TRUCK STOP
VERNAL, UTAH

CONTRACT NO. DACW45-90-D-9002
DELIVERY ORDER NO. 0088
IT PROJECT NO. 519063

PREPARED BY:

IT CORPORATION
2790 MOSSIDE BOULEVARD,
MONROEVILLE, PA 15146-2792

PREPARED FOR:

U. S. ARMY CORPS OF ENGINEERS
OMAHA DISTRICT
215 NORTH 17TH STREET
OMAHA, NEBRASKA 68102

APRIL 1994

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1.0 Introduction

IT Corporation (IT) was requested by the U.S. Army Corps of Engineers (USACE) on March 2, 1994, to provide support for an Immediate Response Action at the Naples Truck Stop in Vernal, Utah, under Contract No. DACW45-90-D-9002 and Delivery Order No. 88. The scope of this project consists of the recovery unleaded gasoline and treatment of impacted groundwater which has leaked from an underground pipeline located on the Naples Truck Stop property, and migrated to the southeast onto adjacent properties. The main focus of the recovery activities will be on the Questar Pipeline Company property.

This Interim Report details the product recovery and data collection activities accomplished at the site to this point. These activities include:

- Installation of three 2" diameter monitoring wells, one 6" diameter recovery well, five 4" diameter recovery wells, at strategically placed locations.
- Backfill an abandoned recovery trench which intersected the Questar Pipeline Company property.
- Conduct a 48 hour continuous pumping test from the 6" diameter recovery well to determine aquifer characteristics.
- Design, install and operate an interim vacuum enhanced pumping (VEP) system including an air stripping/granular activated carbon groundwater treatment system.
- Installation of a piping system to connect recovery wells for use during the interim and permeant recovery system operation.
- Collection and analysis of influent and effluent air stripper samples to evaluate system performance.
- Collection and analysis of extracted soil vapor samples during the VEP pilot test to evaluate the potential recovery rates and treatment requirements if needed.

This report is intended to describe the recovery work completed at the site and to present the results of the initial tests conducted.

1.1 Site Background

The Naples Truck Stop is located on U.S 40 in Vernal, Utah. A release of unleaded gasoline occurred as a result of a ruptured underground supply line from an aboveground storage tank. The quantity of fuel released is unknown. The product migration from the release appears to be in the southeastern direction and is intersecting a tributary to the Green River as well as a storm sewer and sanitary sewer service line.

The release has encroached on Questar Pipeline property and is effecting their daily operations. Questar initiated some recovery actions including the installation of a recovery trench across their property. The trench was to be used in combination with a biological treatment system. IT was requested by the USACE to provide support for the initial investigation and subsequent removal activities.

2.0 Recovery/Monitoring Well Installation

Three monitoring wells and 6 recovery wells were installed in the plume area just upgradient of Questar's office building. Figure 1 shows the location of the three monitoring wells and six recovery wells. The monitoring wells were installed for the purpose of collecting data for the aquifer test. The recovery wells were located to optimally capture, as part of an interim Vacuum Enhanced Pumping (VEP) capture system, the leading edge and downgradient portions of the plume.

2.1 Monitoring Well Installation/Development Procedures

Appendix A presents the well completion diagrams and boring logs for the monitoring wells installed by IT. The monitoring wells are constructed of 2-inch diameter Polyvinyl Chloride (PVC). The wells were developed by bailing approximately 6 gallons from each monitoring well. Monitoring wells MW-11 and MW-12 had a substantial amount of silt in the bottom which was removed during bailing. Monitoring Wells MW-11 and MW-12 were bailed continuously without going dry. Monitoring Well MW-13 was bailed dry and required about 20 minutes to recover.

2.2 Recovery Well Installation/Development Procedures

The locations of Recovery Wells RW-1, RW-2, RW-3, RW-4 RW-5 and RW-6 are shown on Figure 1. The boring logs and well completion diagrams for the recovery wells installed by IT are also included Appendix A. Recovery well RW-1 is constructed with 6 inch stainless steel. The remaining recovery wells are constructed of 4 inch diameter PVC. Recovery wells were developed by bailing from 25 to 45 gallons of water from each recovery well. Development water from the wells remained slightly turbid at the end of the development. Recovery well RW-3 bailed dry and required about 20 minutes to recover. Recovery well RW-5 bailed down but did not go completely dry. The remaining recovery wells bailed without measurable a drop in the water surface.

3.0 Pilot Test

3.1 Recovery Trench Closure

The recovery trench which traversed the Questar Pipeline property was required to be backfilled to the original groundsurface elevation prior to the execution of the VEP pilot test. This trench was about 50% installed when the decision was made to abandon this method of extraction. This design called for a trench ten feet deep by two feet wide with a 12 inch diameter perforated pipe placed along the bottom. The trench was then to be filled with coarse gravel to allow for the influx of groundwater and product. Extraction sumps were also planned for installation at several locations along the trench.

In order to backfill the trench, the existing gravel and pipe was removed using a backhoe, and placed in a truck for transport to the soil holding area located in Questar's adjacent pipe storage yard. Once the gravel was removed, the soil originally excavated from the trench was placed back in the trench and compacted with the backhoe bucket. Due to the high groundwater elevation and unstable nature of the trench sidewalls, alternative compaction methods were unsuccessful.

Once the trenches were backfilled to within approximately three feet of the surface, road base material was obtained from offsite sources and placed in the trench. This material was well compacted using a plate compactor and leveled with the bottom of the existing asphalt layer.

The lack of operational asphalt plants in the area due to seasonal conditions at the time of this work required an alternative method of temporarily sealing the voids in the asphalt so as not to negatively affect the VEP pilot test results. The decision was made to place 6 mil plastic sheeting over the open asphalt areas and cover the entire sheeting with gravel, creating a seal along the edges of the asphalt cuts. This procedure was also followed in several other areas at the site were excavating activities had taken place. This method was designed only as a temporary measure, and the asphalt is to be restored as soon as possible.

3.2 Groundwater Monitoring

Groundwater level and product thickness measurements were collected from monitoring wells at the site on March 24, 1994. The measurements represent static conditions since they were collected prior to the aquifer or VEP testing activities. Table 1 presents the groundwater level and product thickness measurements taken in 13 monitoring wells. Product was detected in Monitoring Wells MW-5 and MW-8. Water table elevations are based on a 100 foot site specific base line elevation and not mean sea level. Figure 2 shows the water table elevations and groundwater elevation contours. Based on the March 24, 1994 measurements, groundwater flow in the water table is to the southeast. The groundwater elevation high in the vicinity of monitoring wells MW-13 and recovery well RW-1, may be due to sanitary sewer line seals damaged by the gasoline release.

3.3 VEP Pilot Test

On March 25 and 26, 1994, IT personnel conducted a VEP pilot test on recovery well RW-1. The purpose of this test was to assess the aquifer characteristics/soil permeability of the study area, and determine the feasibility of using this particular technology for the recovery of petroleum product as well as long term restoration of impacted soils and groundwater at the site. The following section describes the VEP technology, pilot test procedures, and pilot test results.

3.3.1 VEP Technology

VEP combines the attributes of vacuum extraction and groundwater withdrawal. The process is able to:

- Recover residual volatile organic compounds (VOCs) below the static water table, where vacuum extraction is typically not applicable

- Recover using a single point both floating product and dissolved phase groundwater contamination

- Recover VOCs from within the cone of depression created by pumping of the aquifer, where pump and treat is normally not effective

- Increase the water extraction rates in low permeability settings, thereby increasing the well capture zone

- In certain low permeability settings, eliminate the use of downhole pumps entirely through the use of entrainment extraction.

VEP effectively remediates the "smear" zone by the combined use of vapor and water extraction. The static water table is lowered by water extraction. This exposes the smear zone in the formerly saturated area to the air flow induced by the applied vacuum. The smear zone is then more readily remediated.

During vacuum extraction operations, groundwater recovery rates are significantly greater in the well vicinity. The negative pressure gradient helps overcome the capillary forces which tend to hold the water trapped in the soil pore spaces. The negative pressure also increase the effective drawdown within the well which increases flow velocity of water into the well. This increased pumping rate causes a larger drawdown, and thereby extends the capture zone of the well.

In some low permeability aquifers, downhole conventional pumps may be eliminated. Instead of electric or pneumatic down-hole pumps, a vacuum system is used to entrain the water in the extracted air. A piping network leads from each extraction well to the vacuum pump, via a manifold. The vacuum pump transports both the vapors and entrained water to a water/vapor separator. In the separator, the extracted water is removed to be treated.

By not installing downhole pumps and their associated control systems, the operation and maintenance can be greatly simplified. In addition, most of the VOCs are removed from the extracted water during the entraining and transport process. In effect, the entrainment system is inducing the same affect of an air stripper. Because of this, VOC concentrations in the separated water entering the water treatment system are lower than would be expected.

VEP is effective and applicable for this site for the following reasons:

- The site has a limited aquifer thickness where the conventional pump type extraction rate is minimal, due to limited drawdown potential. The use of vacuum withdrawal will significantly increase the water flow rate in the recovery wells, thus expediting recovery time.

- Vacuum extraction will reduce the loading on the groundwater treatment system

- The VEP system will remediate the fringe and capillary zones once the groundwater table is depressed.

To properly size a vacuum dewatering system, a pilot test is often performed. The following parameters are determined by the pilot test:

- Flow rate verses vacuum for both groundwater and vapor
- Vacuum measured verses radial distance from the extraction well

The pilot test provides the following data:

- Vapor flowrate from the extraction well or wells
- Vacuum enhanced groundwater yield
- Hydrocarbon concentrations

This information is then used to determine the size of the vacuum pump required to apply sufficient vacuum on the subsurface, the number and spacing of extraction points, and the size of the vapor and liquid treatment systems, if required.

3.3.2 VEP Pilot Test Procedures

The pilot test was performed on recovery well RW-1, which is constructed of six-inch-diameter stainless steel pipe and extends to a total depth of 17 feet. Monitoring wells MW-5, MW-8 , MW-11, MW-12, and recovery well RW-2 were utilized as vacuum and groundwater monitoring points. Vacuum readings were collected from these wells using a hand held electronic digital manometer. The test was operated to determine the optimal vacuum and vapor flow rate required to achieve the maximum groundwater and soil vapor recovery rates.

Prior to running the pilot test, groundwater level measurements were collected manually and by pressure transducers. The Hermit 2000B data logger system utilizing five pressure transducers placed in Monitoring Wells MW-5, MW-8, MW-11, MW-12 and Recovery Well RW-2 was set up prior to conducting the test. Manual and transducer groundwater level data were used to determine static conditions. During the VEP pilot test the Hermit 2000B data logger was programmed to collect data at 15 minute intervals throughout the test. The VEP pilot test was conducted for 24 hours. During the test manual water level measurements were also collected in Monitoring Well MW-1. These measurements were used to evaluate potential fluctuations in the water table in an area outside the influence of the pilot test.

3.4 Pilot Test Results

Based on review of the data collected during the pilot test that two different conductivity areas exist in the water table at the site. The lowest area of conductivity was measured in the south southwestern direction from recovery well RW-1 to monitoring well MW-5. The highest conductivity area was measured in the southeastern direction from recovery well RW-1 to recovery well RW-2. Hydraulic conductivity values were calculated from the pilot test which show a K value of 17 feet/day (ft/d) in the low conductivity area and a K value of 39 ft/d in the high conductivity area.

The method used in the field to analyse the pumping/drawdown data generated during the VEP pilot test was the Hantush Jacob (1955) curve math method in a software package by In-Situ titled HJ-Match (1987). A second software package by Geraghty and Miller, AQTESOLV, which utilizes the Theis or Cooper-Jacob methods with the Jacob's correction for reduced saturated thickness for unconfined aquifers, was used to verify the conductivities calculated in the field. The results of both techniques are presented in Appendix B. The mathematical summaries presented in Appendix B report aquifer characteristics in the form of Transmissivity. Hydraulic conductivity can be calculated from this by dividing transmissivity by aquifer thickness. VEP enhances this by adding an additional potential drawdown to saturated thickness in the form of a negative drawdown.

Vacuum effect was only detected in recovery well RW-2 as 1.6 inches of water (iw). The remaining four monitoring points did not indicate any detectable vacuum influence. Several reasons exist for the lack of vacuum measured in all radial directions from the extraction well. Monitoring wells screened in the saturated zone only, would require groundwater drawdown to be below the top of the screen in order to expose the unsaturated zone to the vacuum. The presence of a higher conductivity area will channel vacuum effected air flow through the path of least resistance. After review of data collected to date, it appears that a

combination of both factors may be effecting the test results. This data does suggest however that both groundwater and soil vapor are readily available for extraction purposes. Operating parameters collected during the VEP pilot test for Recovery Well RW-1 are included in Appendix B.

The pilot system operated for 24 hours and recovered 3,457 gallons of groundwater for an average groundwater flow rate of 2.4 gallons per minute (gpm). Based on this flow rate and groundwater analytical results obtained from the influent to the air stripping system, 0.028 lbs per hour of total BTEX, or gasoline, were removed through the groundwater treatment system. Hydrocarbon removal rate calculations are included in Appendix B. Additionally, two soil vapor samples were collected approximately 12 hour and 23 hours after beginning the test. The two analytical results indicate that between 591 parts per million (ppm) and 630 ppm were extracted through the soil vapor at any given time, for an average of 610 ppm for the entire test. Using a mass balance equation, the average amount of BTEX removed from the air stream during the pilot test equates to 0.190 lbs per hour. Air flow hydrocarbon removal calculations are included within Appendix B. An average soil vapor flow rate of 24 standard cubic feet per minute (scfm),was measured throughout the test.

4.0 Interim Recovery System Design and Layout

The optimal full scale operational parameters for the interim product recovery system, which addresses the area northwest and upgradient of Questar's building, were determined based on the results of the pilot test. The low conductivity area, which includes Recovery Wells RW-1 and RW-3, displayed a specific capacity value equivalent to 0.04 gpm/ft for a 4-inch diameter well. The maximum drawdown available in this area is 8.5 feet which is achievable at 0.363 gpm. By applying an estimated vacuum of 10 inches of mercury (inHg) to each wellhead in the low conductivity area (RW-1 and RW-3) 11 feet of water of additional effective drawdown will be generated. Total expected groundwater yield for each recovery wells (RW-1 and RW-3) is 0.83 gpm. The high conductivity area, which includes recovery wells RW-2 and RW-6, displayed a specific capacity value equivalent to 0.1 gpm/ft for a 4-inch diameter well. The maximum drawdown available in this area is also 8.5 feet which is achievable at 0.762 gpm. By applying an estimated vacuum of 10 inches of mercury (inHg) to each wellhead in the high conductivity area (RW-2 and RW-6) 11 feet of water of additional effective drawdown will be generated. Total expected

groundwater yield for each recovery well in the high conductivity area (RW-2 and RW-6) is 1.75 gpm. The indicated operational parameters will achieve 75 feet radial influence from any extraction or recovery point (RW-1, RW-2, RW-3, RW-6). Specific capacity and cone of influence calculations are included in Appendix C.

The hydraulic conductivities utilized in the estimations of flow rates for this interim design are based upon the drawdown data collected in the pilot test. This test was conducted on recovery well RW-1. Based upon the results of this test, it appears that recovery well RW-1 is located just outside the high conductivity area. This would result in an accurate estimate of hydraulic conductivities in the lower conductivity region but an underestimation of hydraulic conductivities in the channel fill area which is in the higher conductivity area. Therefore higher recovery rates are to be expected in the higher conductivity areas.

The VEP pilot test performed at the site indicated that 4 recovery wells with a 10 inHg vacuum would have a zone of influence over the entire area upgradient of the Questar building. Recovery wells (RW-1, RW-2, RW-3 and RW-6) were employed to simultaneously withdrawal soil vapor and groundwater. This anticipated zone of influence is depicted on Figure 3, which details the interim recovery system layout.

For the interim recovery system, which has been installed, the combined groundwater and soil vapor extraction recovery wells were fitted with 1.5-inch-diameter drop tubes, inserted to the base of the extraction well screen. A vacuum of approximately 10 inHg has been applied to each wellhead to simultaneously remove hydrocarbon-affected water and volatile hydrocarbons as a residuum within the unsaturated soils. Each individual 1.5-inch line leading from the recovery well to the main influent line is equipped with a check valve, gate valve, pressure gauge, and threaded sample port.

The main influent line directs the recovered water and air stream into a water/vapor separator. From the separator, the water is pumped to an oil/water separator tank. Recovered separate-phase hydrocarbons is collected in an above ground holding tank to await proper disposal. Water containing dissolved hydrocarbons is transported from the oil/water separator into an air stripping system. Finally treated water is transported to discharge. The vapors separated from the groundwater in the water/vapor separator, are routed separately to atmospheric discharge. A complete process flow diagram has been included for this interim product recovery system, as Figure 4. A site plan which depicts the remedial system layout has been included as Figure 5.

5.0 Sample Collection and Analysis

Water and air samples were collected and analyzed in order to evaluate and select the appropriate treatment technologies for site remediation. Two sets of water samples were collected on March 25, 1994, from the air stripper. Within in each set, one influent and one effluent sample were collected to determine the water quality that would be expected during pumping and to evaluate the performance of the air stripper. Water samples were analyzed for volatile organic compounds using EPA Method 8240. The samples were analyzed by IT Analytical Services, a Missouri River District approved lab, in Austin, Texas. As shown in the Certificate of Analysis, benzene, toluene, ethylbenzene and xylene (BTEX), gasoline constituents, were detected in the influent samples. After going through the air stripper tower, ethylbenzene and xylenes were non detect and the levels of benzene and toluene were substantially reduced. The final design of the water treatment system will achieve lower levels of these compounds. Also one effluent sample was collected on April 5, 1994 and analyzed for parameters using EPA Method 8240. Analytical results revealed non-detectable concentrations for all constituents analyzed.

Two air samples were collected. The first air sample was collected twelve hours into the test and the second sample was collected 23 hours into the test. The samples were collected using dedicated laboratory decontaminated vacuum canisters. IT Analytical Services' Air laboratory in Cincinnati, Ohio conducted the analysis for volatile organic compounds using EPA Method TO-14.

All analytical results and chain of custody records can be found in Appendix D.

6.0 Additional Data Requirements

The following data is needed for review and evaluation to fully characterize the site and design the full scale recovery system:

- Boring logs and well completion diagrams from Questar monitoring wells MW-1 through MW-10. EPA wells NGMW-1 through NGMW-7, monitoring wells MW C-1 through MW C-3, and monitoring wells T-4 and T-5.

- Existing groundwater analytical data from the above mentioned wells, if any.

- Groundwater levels and product thickness data during static conditions. At a minimum this data should be collected from all the wells on a single day or event.

- Groundwater samples from wells without product, if none were collected.

This data should be reviewed prior to recommending any additional wells or activities to delineate the extent of contamination or the development of additional interim measures.

Tables

TABLE 1

GROUNDWATER MONITORING DATA
MARCH 24, 1994
(Static Condition)

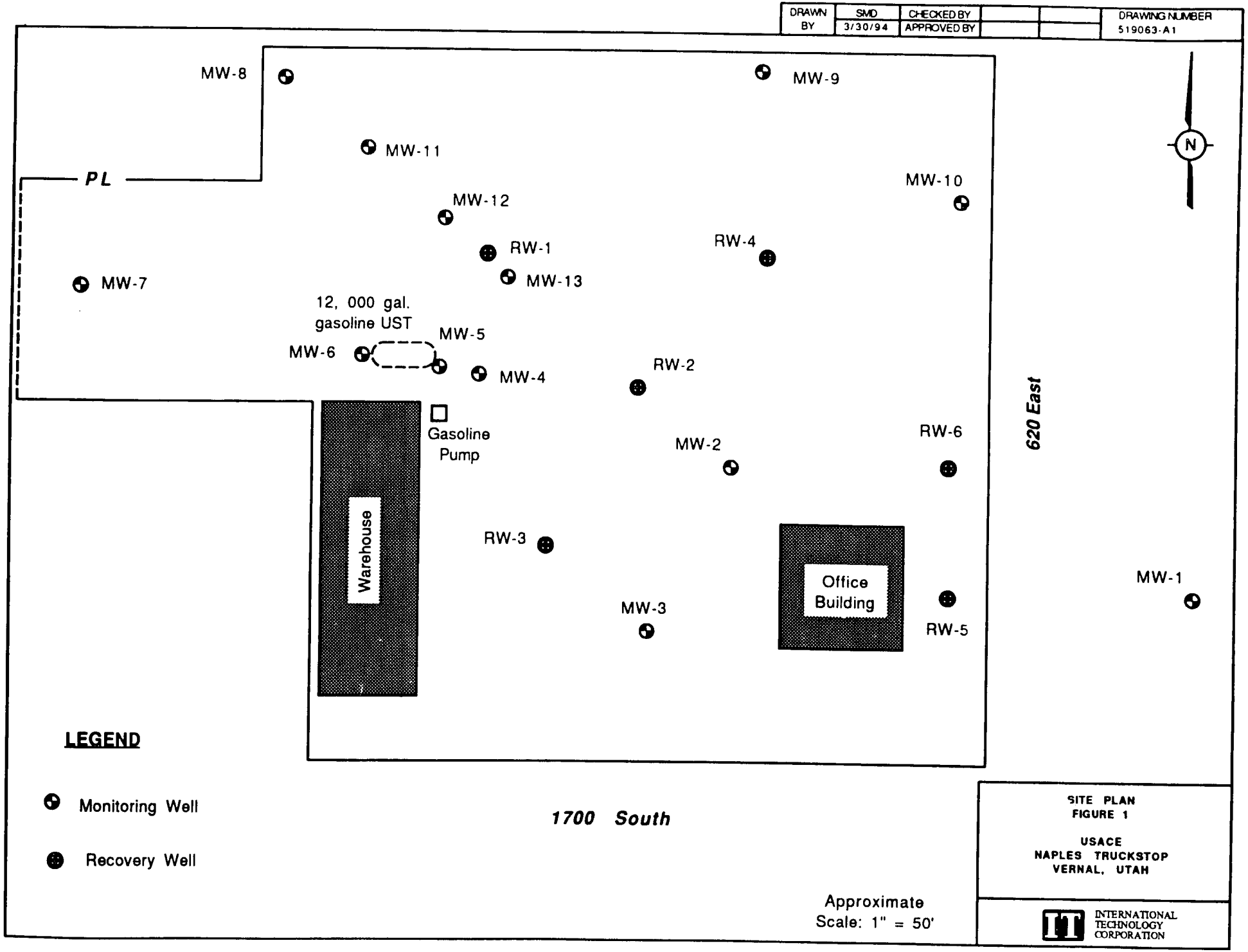
NAPLES TRUCK STOP
VERNAL, UTAH

Well	Casing Elevation (Feet)	Depth to Water (Feet)	Depth to Product (Feet)	Water Table Elevation (Feet)	Product Thickness (Feet)
MW-1	99.21	8.62	-	90.59	0.00
MW-2	100.08	5.86	-	94.22	0.00
MW-3	99.97	6.55	-	93.42	0.00
MW-4	104.41	NA	NA	NA	0.00
MW-5	101.94	6.53	5.98	95.82*	0.55
MW-6	101.72	5.86	-	95.86	0.00
MW-7	103.17	5.50	-	97.67	0.00
MW-8	103.42	6.60	5.90	97.35*	0.70
MW-9	101.07	6.18	-	94.89	0.00
MW-10	99.72	6.28	-	93.44	0.00
MW-11	102.07	6.15	-	95.92	0.00
MW-12	102.45	6.46	-	95.99	0.00
MW-13	102.56	6.40	-	96.16	0.00

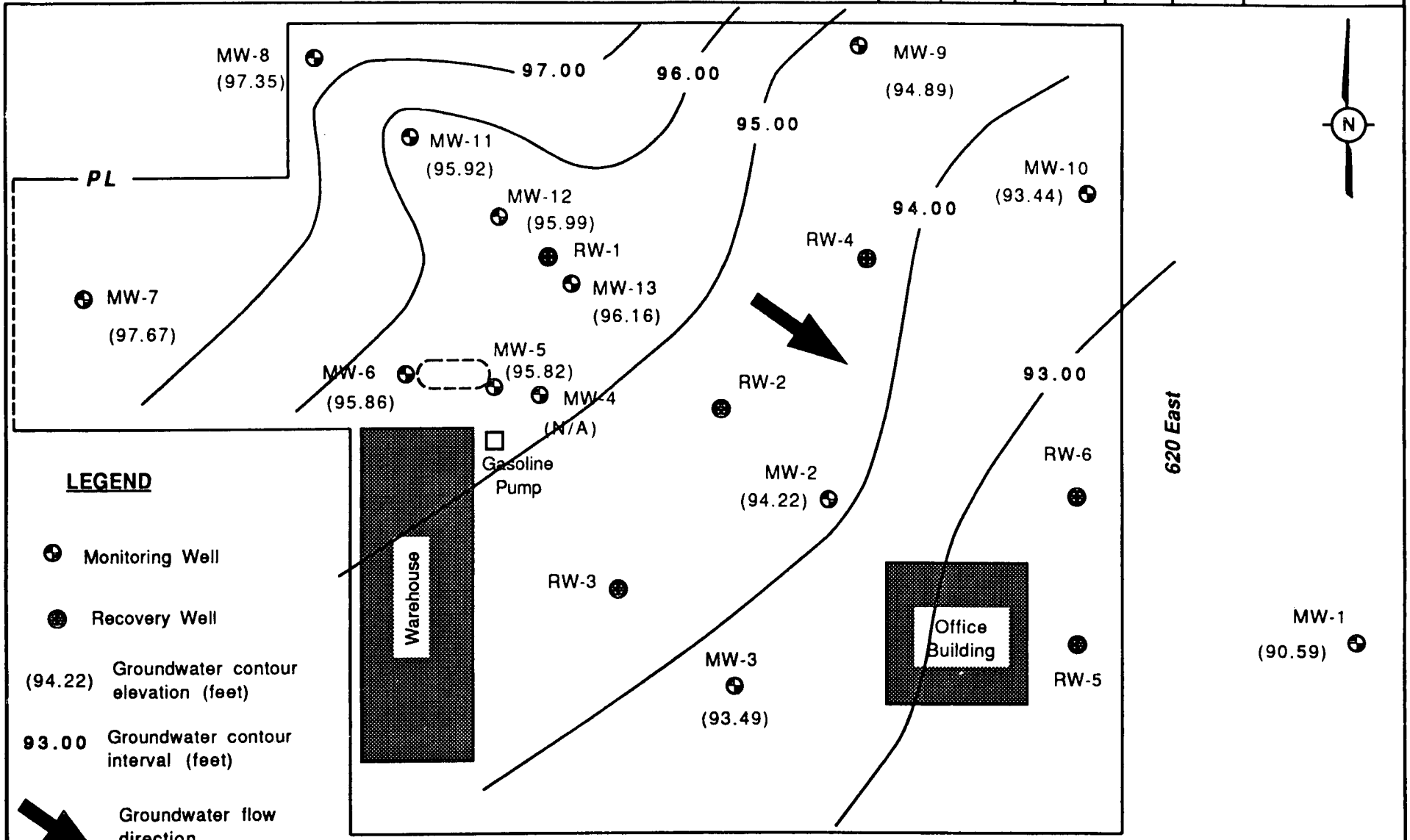
* Water Surface Elevation Correction for Wells Exibiting Product:

Corrected Water Surface Elevation = Uncorrected Water Surface Elevation + [(Product thickness) x 0.75]

Figures


DRAWN BY
SMD
3/30/94
CHECKED BY
APPROVED BY
DRAWING NUMBER
519063-A1
MW-8
MW-9
MW-11
PL
MW-12
MW-10
RW-1
RW-4
MW-13
MW-7
12, 000 gal.
gasoline UST
MW-5
MW-6
MW-4
RW-2
620 East
Gasoline
Pump
MW-2
RW-6
Warehouse
RW-3
Office
Building
MW-1
MW-3
RW-5
N
LEGEND
Monitoring Well
Recovery Well
1700 South
Approximate
Scale: 1" = 50'
SITE PLAN
FIGURE 1
USACE
NAPLES TRUCKSTOP
VERNAL, UTAH
INTERNATIONAL
TECHNOLOGY
CORPORATION

DRAWN BY	SMD	CHECKED BY			DRAWING NUMBER
	4/14/94	APPROVED BY			519063-A1



GROUNDWATER ELEVATION CONTOUR MAP
FIGURE 2

USACE
NAPLES TRUCKSTOP
VERNAL, UTAH

INTERNATIONAL TECHNOLOGY CORPORATION

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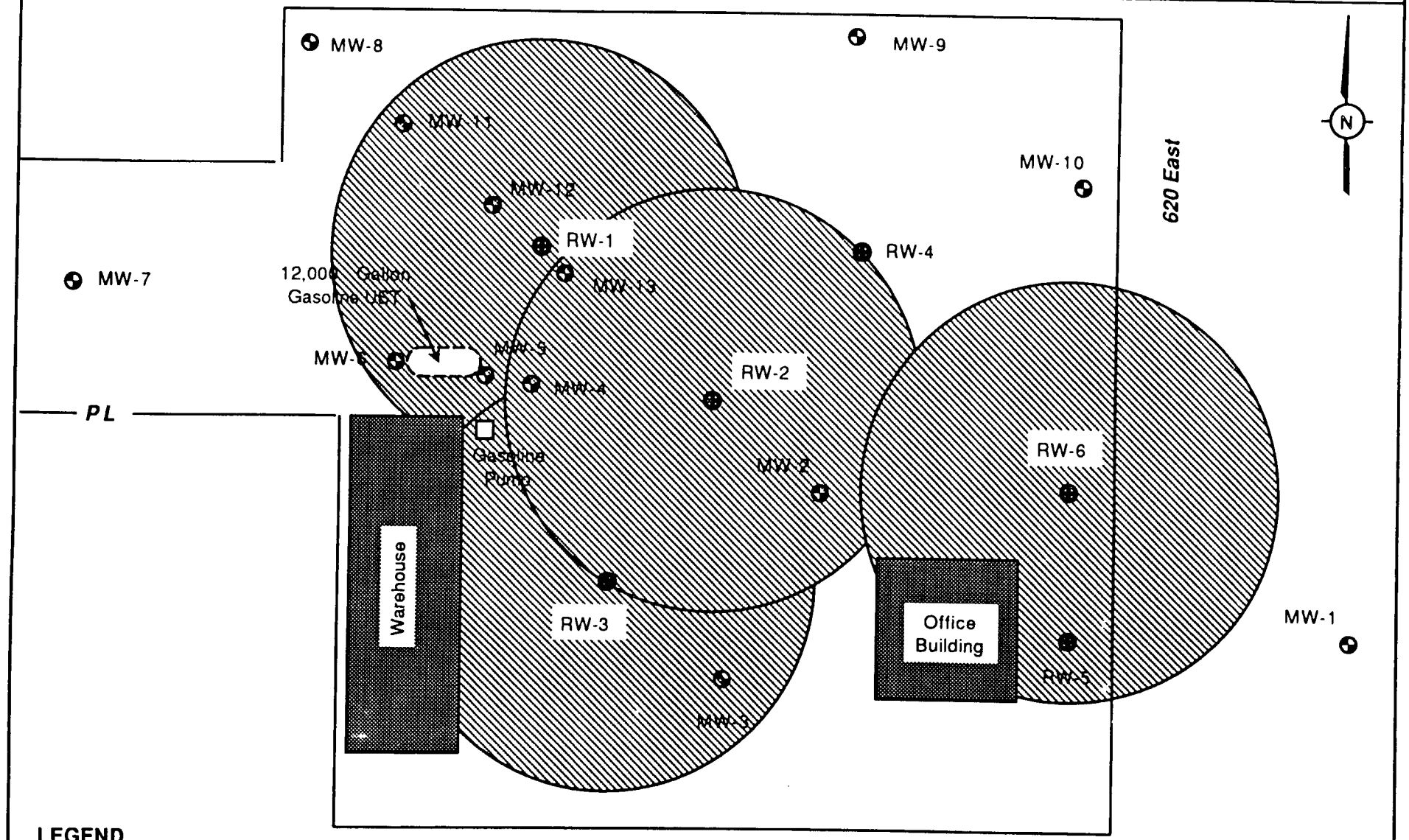
	3/14/94	APPROVED BY			519063-A1

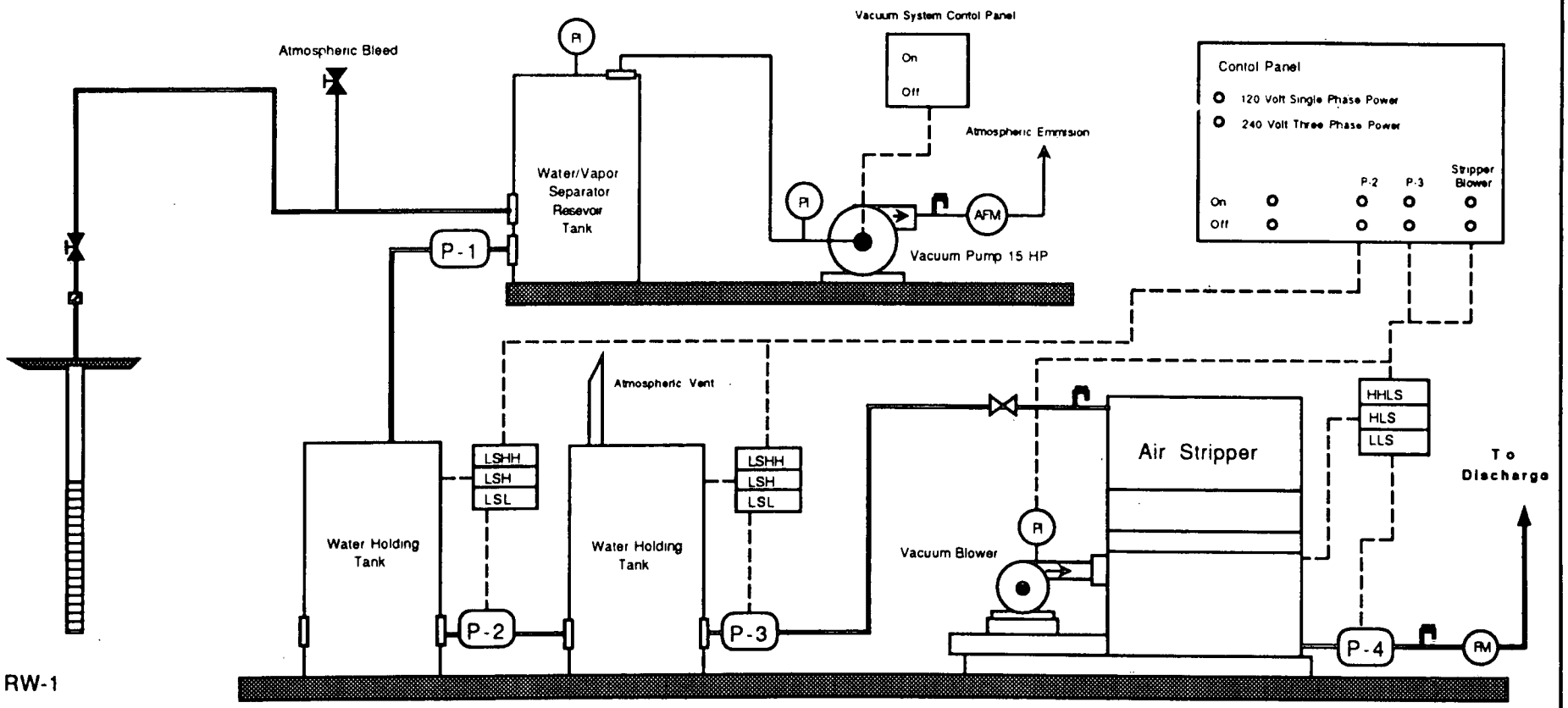


GROUNDWATER
CONE OF INFLUENCE
FIGURE 3

USACE
NAPLES TRUCKSTOP
VERNAL, UTAH

INTERNATIONAL
TECHNOLOGY
CORPORATION

DRAWN BY		CHECKED BY			DRAWING NUMBER
		APPROVED BY			



Groundwater Treatment Unit

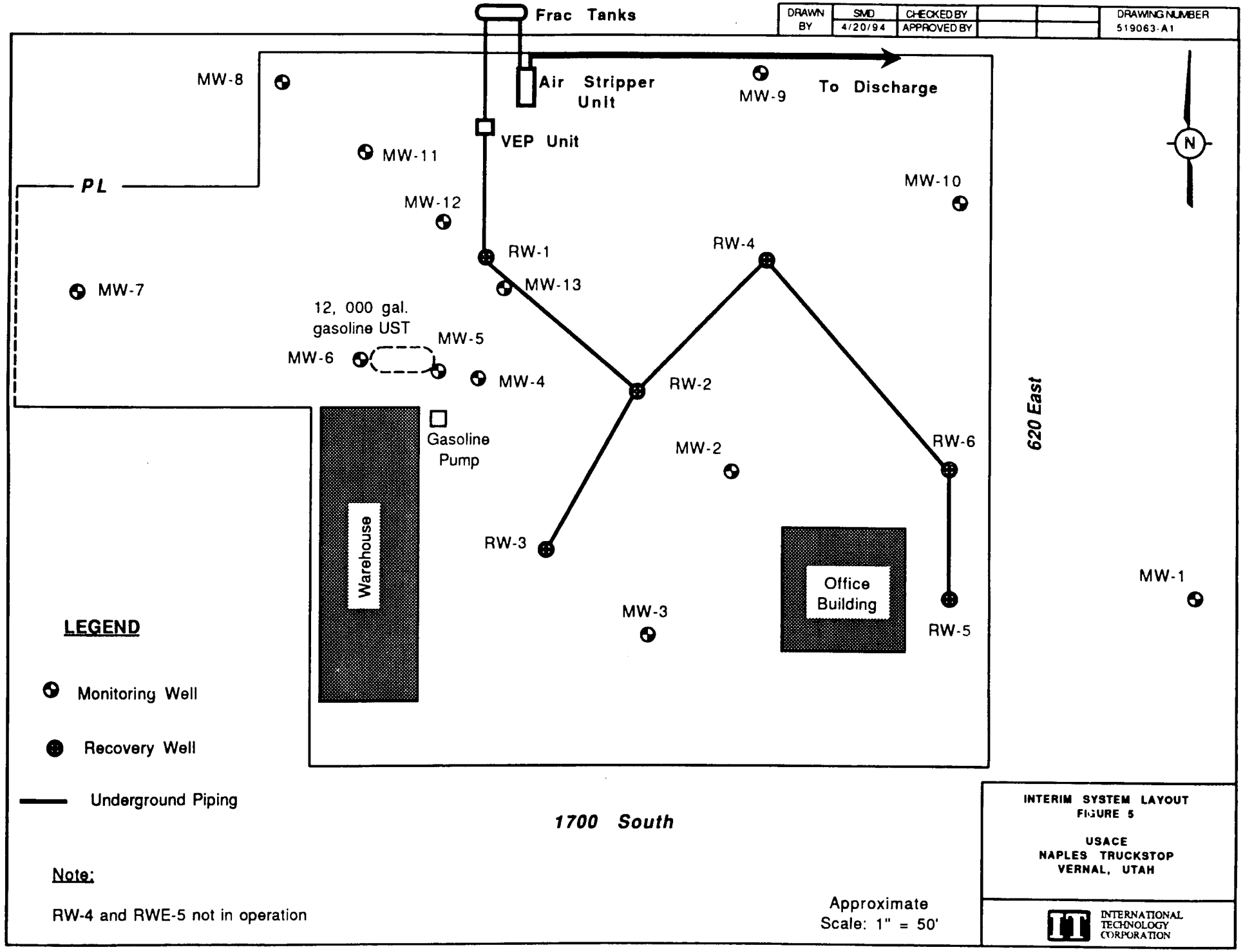
LEGEND:

- Sampling Port
- FM — Flowmeter
- AFM — Air Flow Meter
- PI — Pressure Gauge
- Check Valve
- Gate Valve
- P-1, 2, 3 — Transfer Pump
- Threaded Port to Measure Vacuum Pressure
- LSHH — Level Switch High High
- LSH — Level Switch High
- LSL — Level Switch Low
- Failsafe Control Cable

INTERIM RECOVERY SYSTEM PROCESS FLOW DIAGRAM FIGURE 4

USACE NAPLES TRUCKSTOP VERNAL, UTAH

INTERNATIONAL TECHNOLOGY CORPORATION


Frac Tanks
DRAWN BY
SMD
4/20/94
CHECKED BY
APPROVED BY
DRAWING NUMBER
519063-A1
MW-8
Air Stripper Unit
MW-9
To Discharge
VEP Unit
MW-11
PL
MW-12
MW-10
RW-1
RW-4
MW-7
MW-13
12, 000 gal. gasoline UST
MW-5
MW-6
MW-4
RW-2
620 East
Gasoline Pump
MW-2
RW-6
Warehouse
RW-3
Office Building
MW-1
MW-3
RW-5
N
LEGEND
Monitoring Well
Recovery Well
Underground Piping
1700 South
Note:
RW-4 and RWE-5 not in operation
Approximate Scale: 1" = 50'
INTERIM SYSTEM LAYOUT
FIGURE 5
USACE
NAPLES TRUCKSTOP
VERNAL, UTAH
INTERNATIONAL TECHNOLOGY CORPORATION

Appendix A

Boring Logs and Well Completion Diagrams

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 579063	PROJECT NAME: USACE NAPIES Truckstop UT		
BORING NUMBER: MW-11	COORDINATES:	DATE: 3/5/94	
ELEVATION	GWL: Depth Date/Time	DATE STARTED: 3/5/94	
ENGINEER/GEOLOGIST: Dave Cochran	Depth Date/Time	DATE COMPLETED: 3/5/94	
DRILLING METHODS:		PAGE 1 OF 1	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER ( )	RECOVERY (FT)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
				Asphalt. 0.5'				
				Hard, silty clay, moist				
5				Hard silty clay with slight petroleum odor, moist 6.0'				
				Very Hard silty clay and cobbles, moist 8.5'				
10				Hard silty clay, moist 13.0'				
				Bottom of boring at 13.0'				
15								

NOTES:

Drilling Contractor _____

Drilling Equipment _____

Driller: _____

_____

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 519063	PROJECT NAME: USACE NAFISS Truckstop UT		
BORING NUMBER: MW-12	COORDINATES:	DATE: 3/5/94	
ELEVATION:	GWL: Depth / Date/Time:	DATE STARTED: 3/5/94	
ENGINEER/GEOLOGIST: Dave Cochran	Depth / Date/Time	DATE COMPLETED: 3/5/94	
DRILLING METHODS:		PAGE 1 OF 1	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER ( )	RECOVERY FT	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
				~~Asphalt~~ 0.5'				
				Hard, light medium brown, Silty Clay, moist				
5				Hard, light medium brown, silty clay with slight petro. odor, moist				
				8.5				
				Cobble Layer, moist 9.5				
10				Hard, greenish brown, silty clay with scattered cobbles, moist.				
15				Bottom of Boring at 15.0'				

NOTES:

Drilling Contractor _____

Drilling Equipment _____

Driller: _____

_____

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 519063	PROJECT NAME: USACE NAPLES Truck Stop IRT		
BORING NUMBER: MW-13	COORDINATES:	DATE: 3/5/94	
ELEVATION:	GWL: Depth / Date/Time	DATE STARTED: 3/5/94	
ENGINEER/GEOLOGIST: Dave Cochran	Depth / Date/Time	DATE COMPLETED: 3/5/94	
DRILLING METHODS:		PAGE 1 OF 1	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER ( )	RECOVERY (FT)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
				Asphalt. 0.5				
5				Hard, medium brown, silty clay, moist				
				8.5				
10				Hard, medium grayish brown, silty clay with scattered cobbles, moist				
15				Bottom of boring at 15.0' well set at 13.0'				

NOTES:

Drilling Contractor _____

Drilling Equipment _____

Driller: _____

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 519063	PROJECT NAME: USACE NAPLES Truckstop UT	
BORING NUMBER: RW-1	COORDINATES:	DATE: 3/6/94
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/6/94
ENGINEER/GEOLOGIST: Doug Cochran	Depth Date/Time	DATE COMPLETED: 3/6/94
DRILLING METHODS:		PAGE 1 OF 1

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER ( )	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
5				Hard, medium brown, silty sandy clay, moist				
				8.0				
10				Medium dense, grayish brown clayey silt with sand and cobbles moist				
				Sand, wet 15.0				
15				Shale, wet				
				Bottom of Boring at 17.0'				
20								

NOTES:

Drilling Contractor _____

Drilling Equipment _____

Driller: _____

_____

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 519063	PROJECT NAME: USACE NAPLES Truckstop	
BORING NUMBER RW-2 + RW-3	COORDINATES	DATE 3/10/94
ELEVATION	GWL Depth Date/Time	DATE STARTED: 3/10/94
ENGINEER/GEOLOGIST Dave Cochran	Depth Date/Time	DATE COMPLETED: 3/10/94
DRILLING METHODS		PAGE 1 OF 1

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
5				Hard, medium brown, silty sandy clay, moist				
				8.0				
10				Medium dense, gray, 1/2 brown clayey silt with sand and cobbles, moist				
				Sand, wet 15.0				
15				Shale, wet 17.0				
				Bottom of Boring at 17.0'				
20								

NOTES:

Drilling Contractor _____

Drilling Equipment _____

Driller: _____

_____

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 519063	PROJECT NAME: USACE NAPIS Truckstop UT		
BORING NUMBER: RW-4 & RW-5	COORDINATES:		DATE: 3/10/94
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/10/94
ENGINEER/GEOLOGIST: Dave Cochran	Depth	Date/Time	DATE COMPLETED: 3/10/94
DRILLING METHODS:			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
				Hard, medium brown, silty sandy Clay, moist				
5				8.0				
				Medium dense, grayish brown Clayey silt with sand and cobbles, moist.				
10								
15				Sand, wet 18.0				
				Shale, wet 19.0				
20				Bottom of boring at 19.0'				

NOTES:

Drilling Contractor _____

Drilling Equipment _____

Driller: _____

_____

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 519063	PROJECT NAME: NAPLES Truckstop		UT
BORING NUMBER: RW-6	COORDINATES:	DATE: 3 10 94	
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3 10 94
ENGINEER/GEOLOGIST:	Depth	Date/Time	DATE COMPLETED: 3 10 94
DRILLING METHODS:		PAGE 1 OF 1	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
5				Hard, medium brown, silty sandy clay, moist				
				8.0				
10				Medium dense, grayish brown clayey silt with sand and cobbles, moist				
15				Sand, wet 17.0				
				Shale, wet 18.0				
20				Bottom of Boring at 18.0'				

NOTES:

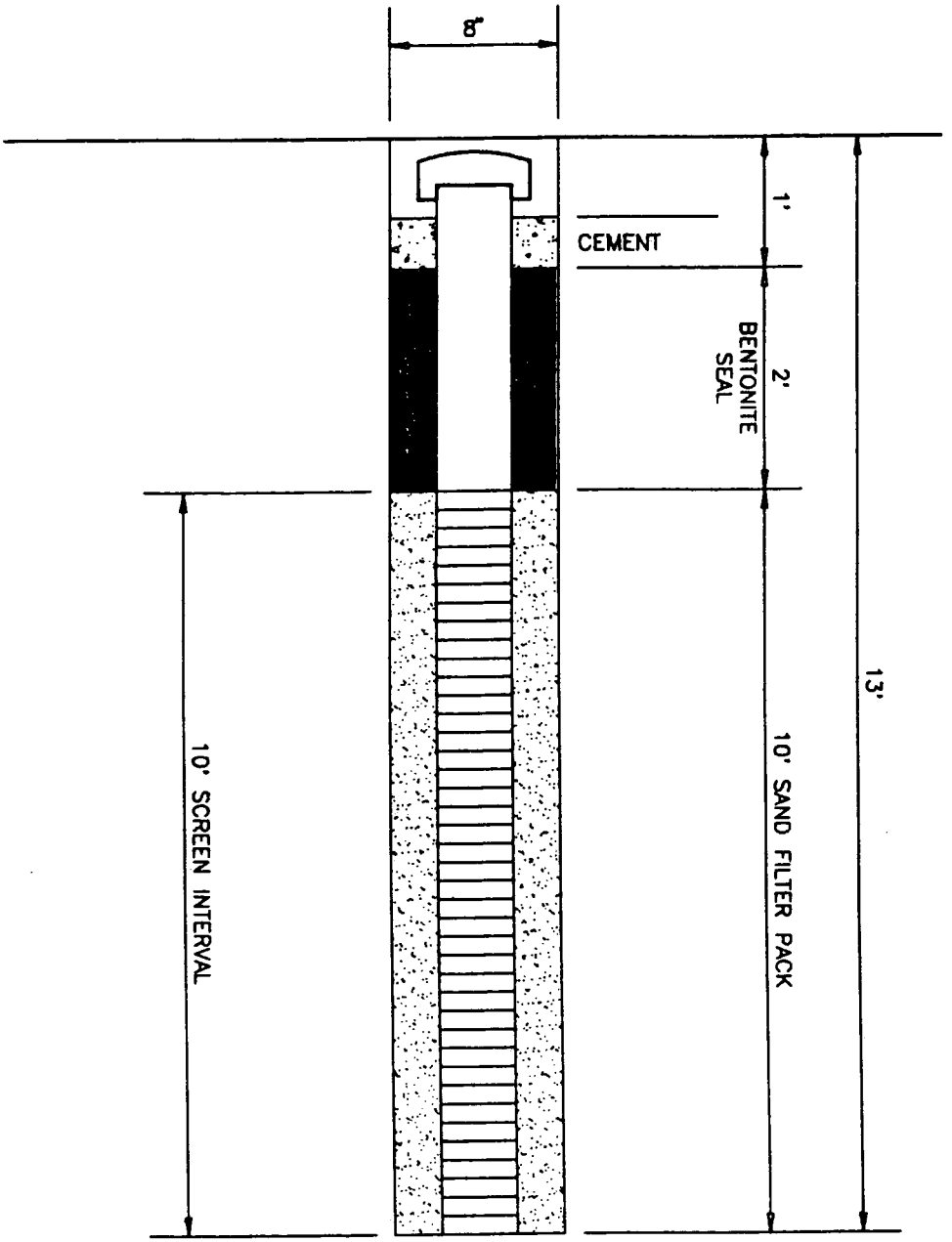
Drilling Contractor _____

Drilling Equipment _____

Driller: _____

_____

DRAWN BY	C.J.B. 04-20-94	CHECKED BY		DRAWING NUMBER 519063-A5
		APPROVED BY		



WELL DIAGRAM FOR TYPICAL
2" PVC WELL
MW-11
NAPLES TRUCK STOP
VERNAL, UTAH

PREPARED FOR

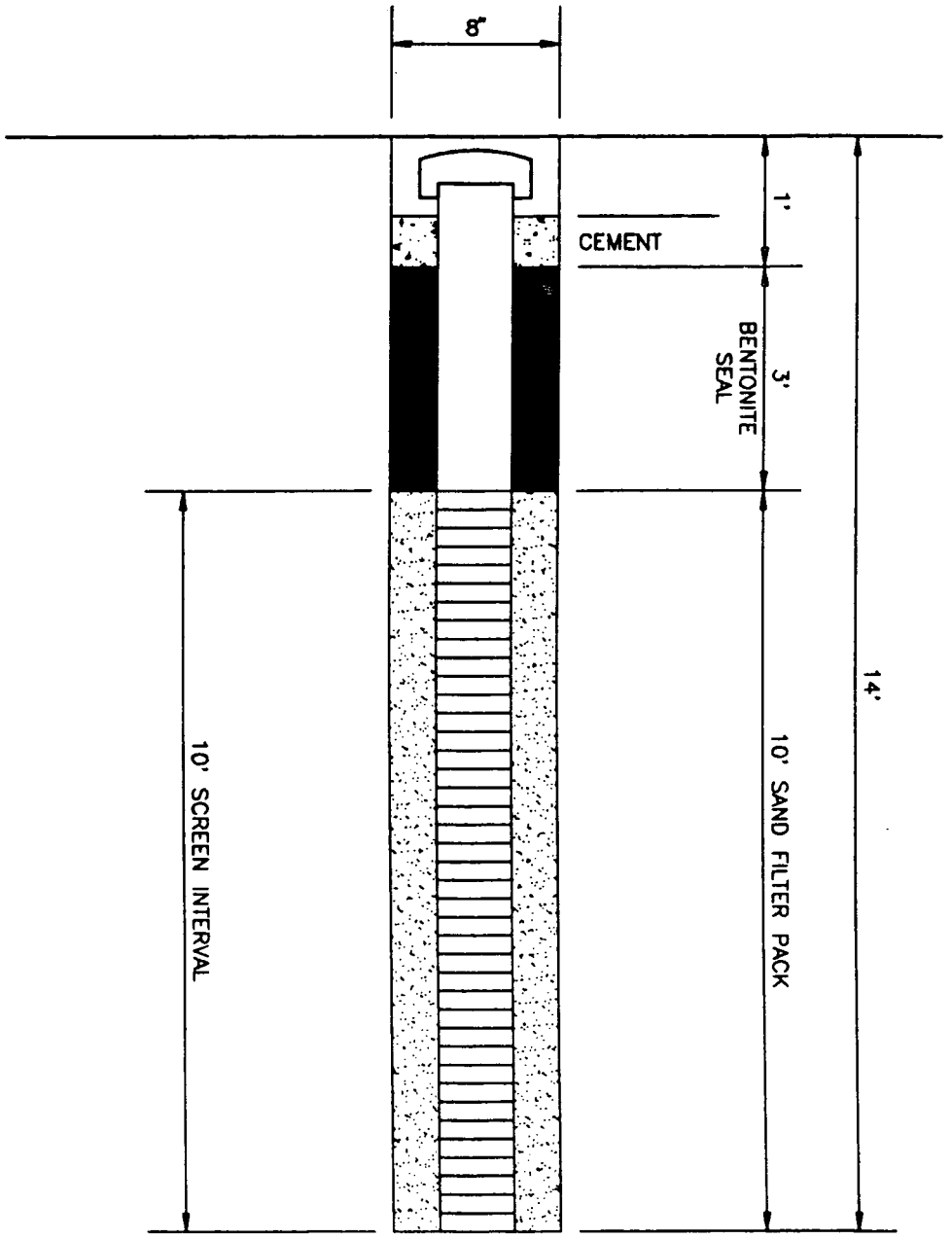
ACOG
VERNAL, UTAH

INTERNATIONAL TECHNOLOGY CORPORATION

132298

04-21-94
10:07 AM

DRAWN BY	C.J.B.	CHECKED BY		DRAWING NUMBER
	04-20-94	APPROVED BY		519063-A6



WELL DIAGRAM FOR TYPICAL
2" PVC WELL
MW-12
NAPLES TRUCK STOP
VERNAL, UTAH

PREPARED FOR

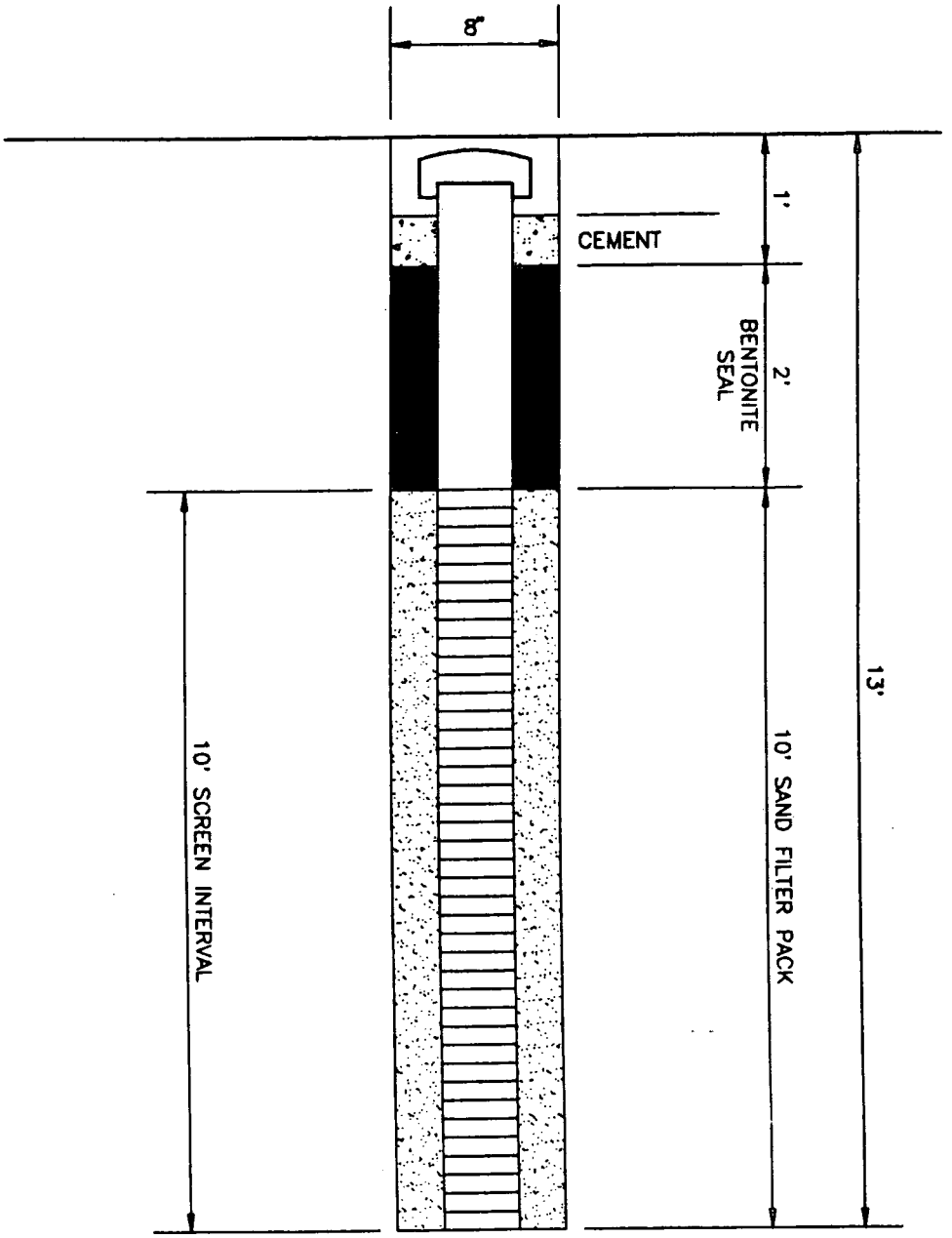
ACOG
VERNAL, UTAH

INTERNATIONAL TECHNOLOGY CORPORATION

132298

04-21-94
10:10 AM

DRAWN BY	C.J.B.	CHECKED BY		DRAWING NUMBER 519063-A7
	04-20-94	APPROVED BY		



WELL DIAGRAM FOR TYPICAL
2" PVC WELL
MW-13
NAPLES TRUCK STOP
VERNAL, UTAH

PREPARED FOR

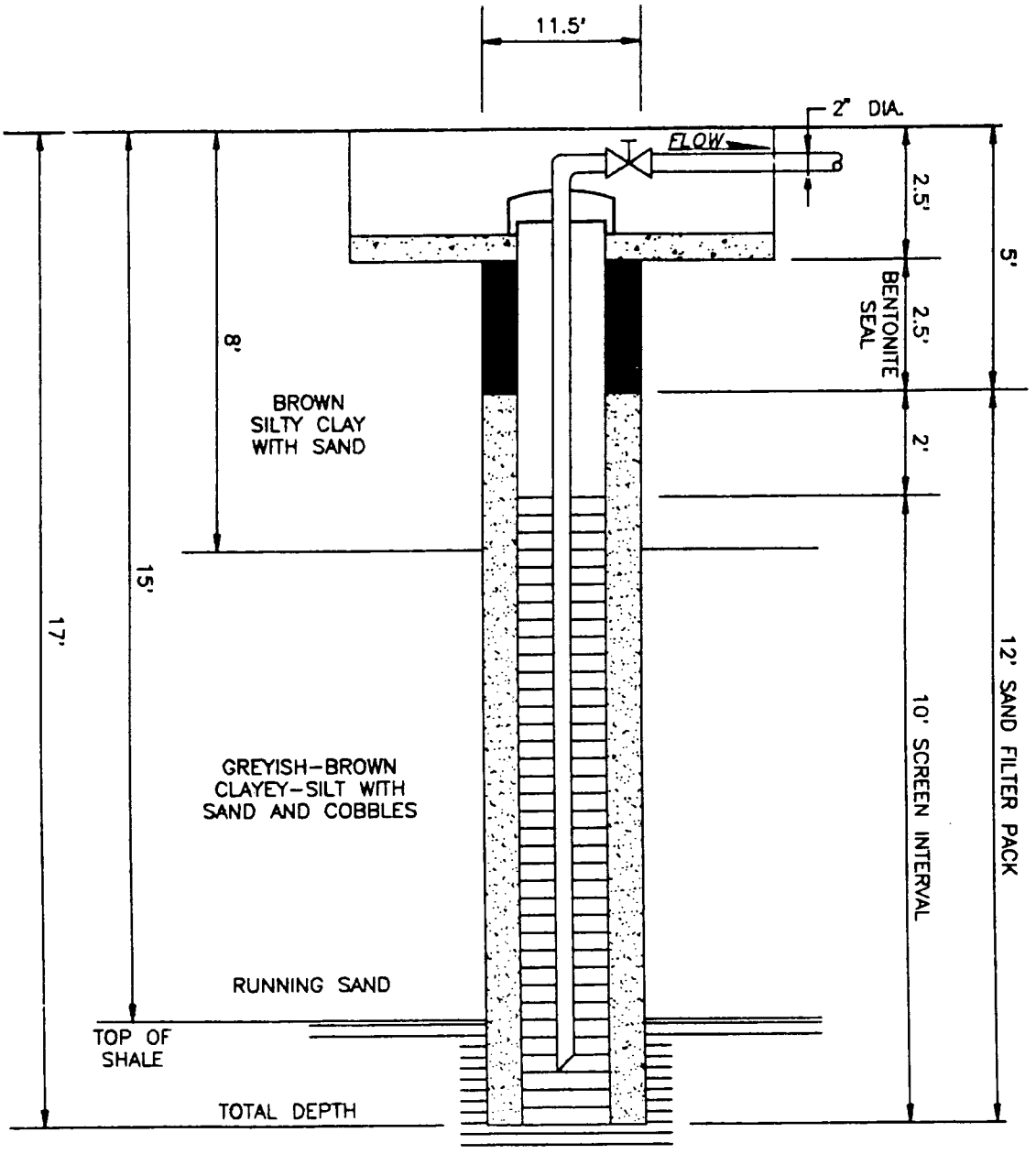
ACOG
VERNAL, UTAH

INTERNATIONAL TECHNOLOGY CORPORATION

132298

04-27-94
10:13 AM

DRAWN BY	C.J.B.	CHECKED BY		DRAWING NUMBER
	04-20-94	APPROVED BY		519063-A1



WELL DIAGRAM FOR TYPICAL 6" SS WELL
NAPLES TRUCK STOP
VERNAL, UTAH

PREPARED FOR

ACOG
VERNAL, UTAH

INTERNATIONAL TECHNOLOGY CORPORATION

NOTES:

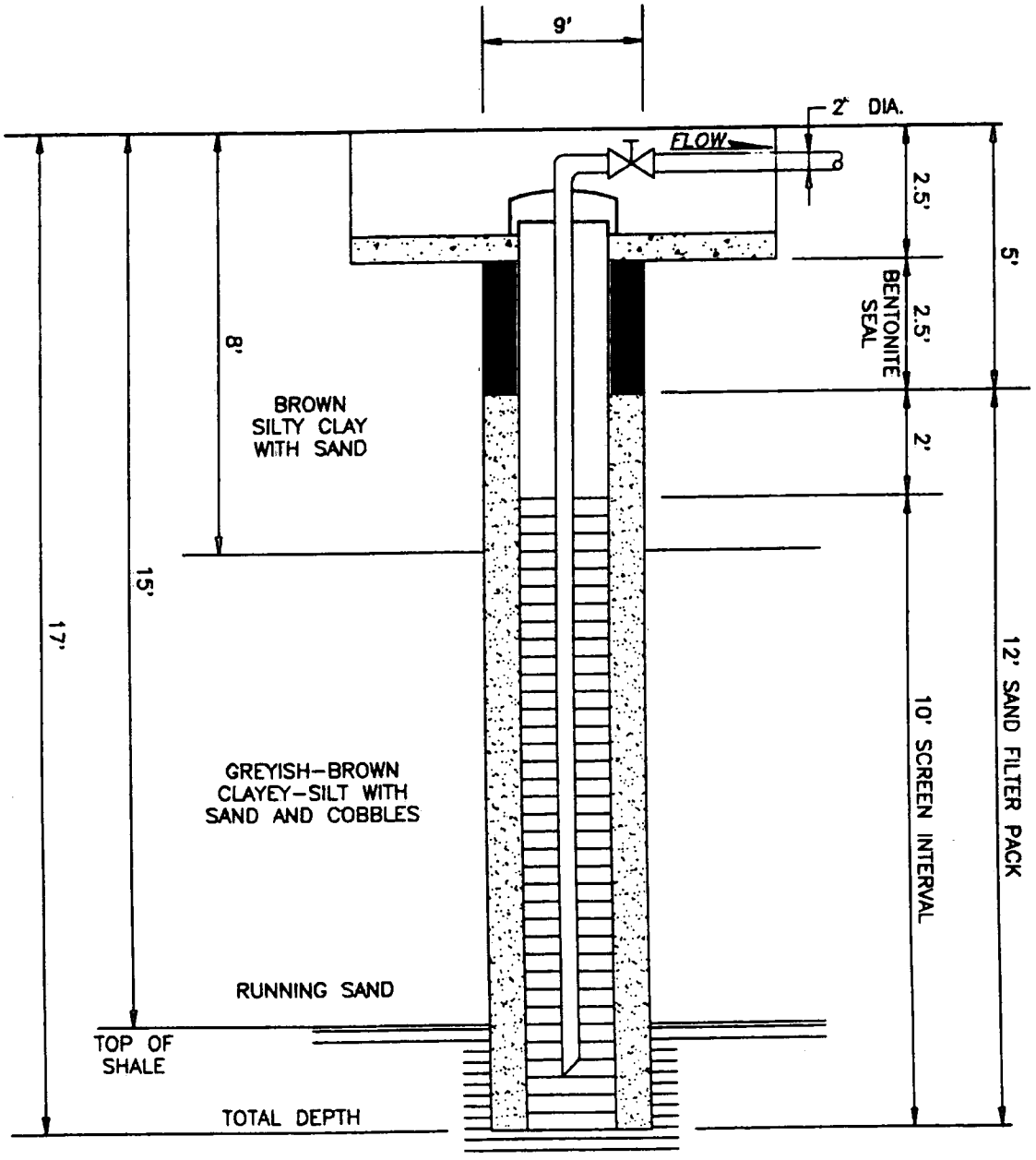
1. WELL SCREEN IS 20 SLOT 6" STAINLESS.
2. DEPTH TO SATURATED ZONE—DRILLLING STATIC LAYER LEVEL.

132298

04-21-94 8:06 AM

DRAWN BY	C.J.B.	CHECKED BY	
	04-20-94	APPROVED BY	

DRAWING NUMBER 519063-A3



WELL DIAGRAM FOR 4" PVC WELL
RECOVERY WELLS #2 & #3
NAPLES TRUCK STOP
VERNAL, UTAH
PREPARED FOR
ACOG
VERNAL, UTAH

NOTE:

WELL SCREEN IS 20 SLOT 4" PVC.

INTERNATIONAL TECHNOLOGY CORPORATION

132298

04-21-94
8:08 AM

DRAWN BY	C.J.B.	CHECKED BY	DRAWING NUMBER
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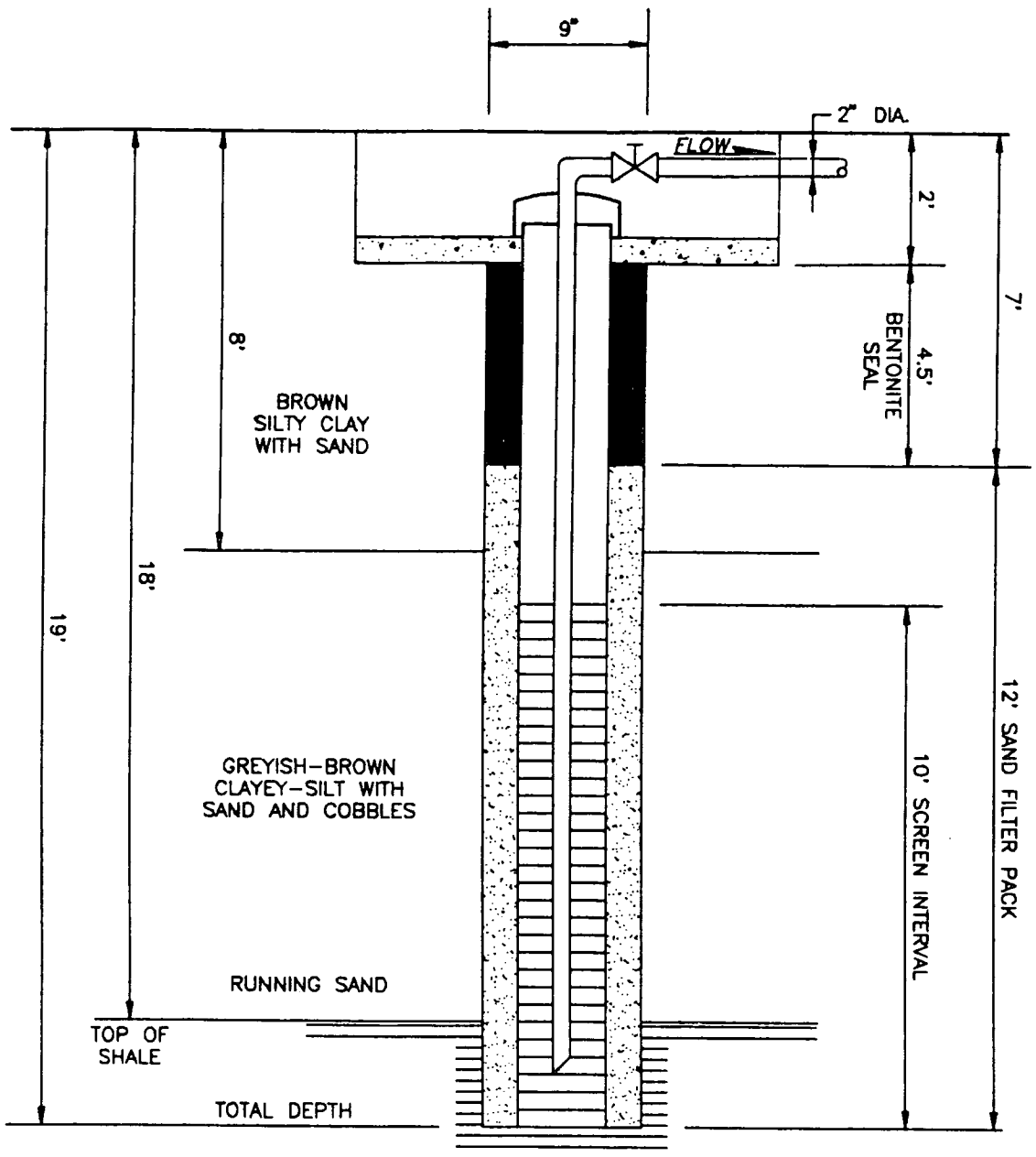


WELL DIAGRAM FOR 4" PVC WELL
RECOVERY WELLS #4 & #5
NAPLES TRUCK STOP
VERNAL, UTAH

PREPARED FOR

ACOG
VERNAL, UTAH

NOTE:

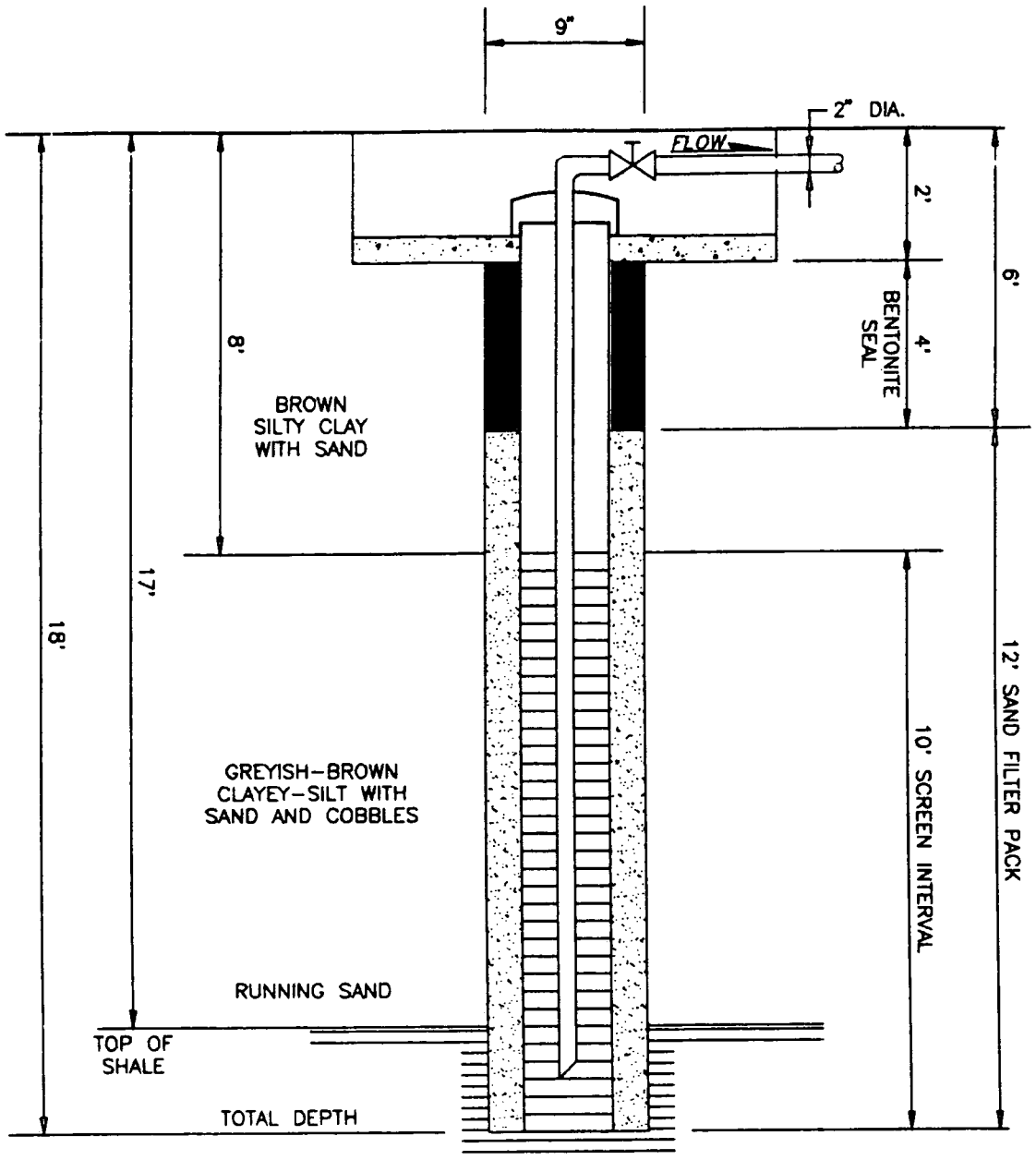
WELL SCREEN IS 20 SLOT 4" PVC.

INTERNATIONAL TECHNOLOGY CORPORATION

132298

04-21-94
8:07 AM

DRAWN BY	CHECKED BY	DRAWING NUMBER
C.J.B.		519063-A4
04-20-94	APPROVED BY	



NOTE:

WELL SCREEN IS 4" PVC 20 SLOT.

WELL DIAGRAM FOR 4" PVC WELL
RECOVERY WELL #6
NAPLES TRUCK STOP
VERNAL, UTAH

PREPARED FOR

ACOG
VERNAL, UTAH

INTERNATIONAL TECHNOLOGY CORPORATION

132298

04-21-94
8:11 AM

Appendix B

VEP Pilot Test Data

INTERNATIONAL TECHNOLOGY CORPORATION

By _____ Date _____ Subject VEP Unit Sheet No. _____ of _____

Proj. No. _____

Chkd By _____ Date _____

02.8

Time	RW-1 (IHg)	RW-1 (iwv)	VEP unit (IHg)	By Pass SCFM	Effluent SCFM	Air Flow from Null (SCFM)	PID PPM	
3/24 static	0.00	0.00	—	—	—	—	—	
3/24 15[00]	19.00	—	22.5	—	—	—	—	start-up by Pass closed
3/24 15[30]	18.5	—	21.5	—	33.2	33.2	0	
3/24 16[00]	18.5	—	21.5	—	33.2	33.2	0	
3/24 16[30]	19.5	—	21.5	—	37.0	37.0	9	
3/24 17[00]	20.5	—	22.0	—	37.0	37.0	5	
3/24 17[30]	21.5	—	22.0	—	46.0	46.0	4	
3/24 18[00]	20.0	—	21.5	—	41.0	41.0	200	
3/24 18[30]	18.0	—	21.5	—	37.0	37.0	300	
3/24 19[30]	18.0	—	21.5	—	26.12	26.12	100	
3/24 20[30]	21.5	—	22.0	—	27.25	27.25	50	
3/24 21[30]	18.4	—	21.5	—	23.98	23.98	40	
3/24 22.30	18.0	—	22.0	—	33.0	33.0	70	
3/24 23[30]	18.0	—	23.0	—	33.0	33.0	45	
3/25 00[30]	20.0	—	22.0	—	27.25	27.25	50	
" 01[30]	18.0	—	22.0		30.52	30.52	48	
02[30]	18.0	—	22.0		26.16	26.16	45.0	
03[30]	18.0	—	22.0		24.0	24.0	50.0	
04[30]	18.0	—	22.0		21.8	21.8	40.0	
05[30]	20.0	—	21.5		21.8	21.8	45.0	
06[30]	18.0	—	22.0		19.62	19.62	60.0	
07[30]	20.0		22.0		19.62	19.62	45.0	
08[30]	18.0		22.0		16.35	16.35	12.0	
09[30]	18.5		22.0		16.35	16.35	45.0	
10[30]	20.0		22.0		19.62	19.62	18.0	
11.30	20.5		22.5		19.62	19.62	25.0	
1330								

INTERNATIONAL TECHNOLOGY CORPORATION

By _____ Date _____ Subject VEP Unit Sheet No. ___ of ___

Chkd. By _____ Date _____ Proj. No. _____

Date/ Time	RW-1 (Hg)	(Vac)	VEP Unit (IHg)		Effluent Scfm		PID ppm	
(3-25)								
1230	18.0"		22.0		19.62	19.62	55	
1430	18.5		22.0		19.62	19.62	45	2nd air sample AS-2
								End Test 3PM
1500								3/25/94
								1500 End Test

Start-up 1500

By _____ Date _____ Subject Vapor Monitor Points Sheet No. _____ of _____

Proj. No.

Time	MW-2 (iwv)	MW-3 (iwv)	MW-5 (iwv)	MW-8 (iwv)	MW-9 (iwv)	MW-11 (iwv)	MW-12 (iwv)	RW-2 (iwv)	Date	RW-13
Static	+0.20	0.00	0.00	0.00	0.00	0.00	0.00	-0.7	3/24	-0.7
1530	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-1.0	3/24	
1600	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-1.1	3/24	
1630	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-1.2	3/24	
1700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-1.3	3/24	
1730	0.0	0.0	0.0	0.00	0.0	0.0	0.0	-1.3	3/24	
1800	0.0	0.0	-0.1	0.00	0.0	0.0	-0.1	-1.4	3/24	
1830	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.4	3/24	
1930	0.0	0.0	0.1	0.0	0.0	0.0	0.0	-1.3	3/24	
2030	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.5	3/24	
2130	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.5	3/24	
2230	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.5	3/24	
2330	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.7	3/24	
0030	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.6	3/25	DLC
0130	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.8	3/25	
0230	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.7	3/25	
0330	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.8	3/25	
0430	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.7	3/25	
0530	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.9	3/25	
0630	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.1	3/25	
0730	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.0	3/25	
0830	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.2	3/25	0.0
0930	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.2	3/25	0.0
1030	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.1	3/25	0.0
1130	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.1	3/25	0.0
1230	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.9	3/25	0.0
1430	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.9	3/25	0.0
1500										end Test

INTERNATIONAL TECHNOLOGY CORPORATION

INTERNATIONAL TECHNOLOGY CORPORATION

By _____ Date _____ Subject Air Stripper Sheet No. _____ of _____

Chkd. By _____ Date _____ Proj. No. _____

Time	Total Flow meter (gals)	GPM (Treated)	Date	
15 00	15950 00	0	3/24	Startup VEP
19 30	15945 00	500 (1.85) 4w	3/24	
20 30	15941 00	900 (6.4)	3/24	
23 30	15937 00	1300 (2.24) 407	3/24	
03 00	15931 72	1828 (2.8) 528	3/25	
06 30	15925 40	2460 (8.5) 632	3/25	
08 30	15922 00	2800 (2.8) 340	3/25	
~~09 30~~	~~1598~~	357		
11 30	15918 43	3157 (1.9)	3/25	
12 30	15915 00	3457 (5) 300	3/25	

Notes

2[45] 1st Influent and Effluent

2nd In/Eff Taken @ 1430 3/25/94

BM: 6.1 7/16"

Survey

L	M	R	Time
4.6 1/4	4.6 5/8	4.7 5/8	16 30
(3.45) 4.6 3/8	4.6"	4.7 5/8	700

MW 1

Time	Level
00 30	8.35
3 30	8.35
10 30	8.35

SE2000
Environmental Logger
3/25/94 15:23

Unit# 2000B Test 0

Setups:	MW-8	MW-11	MW-13	MW-5	RW-2
Type	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)
Mode	Surface	Surface	Surface	Surface	Surface
I.D.	1	2	3	4	5
Reference	0	0	0	0	0
SG	1	1	1	1	1
Linearity	0.005	0	0	0	0.009
Scale factor	19.977	10.005	9.976	10.019	9.989
Offset	0	0.002	0.02	0.032	-0.009
Delay mSEC	50	50	50	50	50

Step 0 03/24 14:56:24

Elapsed Time	MW-8	MW-11	MW-13	MW-5	RW-2
0	-0.018	-0.018	-0.003	-0.003	-0.006
15	-0.018	-0.066	-0.1	-0.037	-0.003
30	-0.031	-0.072	-0.173	-0.053	0
45	-0.025	-0.088	-0.223	-0.063	-0.003
60	-0.025	-0.094	-0.245	-0.069	-0.006
75	-0.025	-0.097	-0.261	-0.079	-0.006
90	-0.025	-0.101	-0.273	-0.082	-0.009
105	-0.006	-0.107	-0.283	-0.091	-0.009
120	0	-0.11	-0.283	-0.094	-0.012
135	0	-0.116	-0.296	-0.098	-0.012
150	0.018	-0.113	-0.299	-0.101	-0.012
165	0.012	-0.116	-0.299	-0.107	-0.015
180	0.018	-0.123	-0.305	-0.11	-0.018
195	0.037	-0.12	-0.311	-0.113	-0.018
210	0.05	-0.129	-0.311	-0.117	-0.022
225	0.069	-0.123	-0.318	-0.12	-0.025
240	0.1	-0.132	-0.321	-0.123	-0.025
255	0.113	-0.135	-0.33	-0.126	-0.025
270	0.119	-0.132	-0.333	-0.132	-0.031
285	0.126	-0.138	-0.333	-0.136	-0.031
300	0.1	-0.138	-0.34	-0.136	-0.031
315	0.088	-0.138	-0.34	-0.139	-0.034
330	0.081	-0.138	-0.343	-0.142	-0.034
345	0.088	-0.142	-0.343	-0.145	-0.037
360	0.094	-0.145	-0.355	-0.148	-0.037
375	0.094	-0.142	-0.355	-0.154	-0.041

390	0.094	-0.148	-0.359	-0.158	-0.041
405	0.088	-0.148	-0.359	-0.161	-0.044
420	0.088	-0.151	-0.359	-0.161	-0.044
435	0.088	-0.148	-0.349	-0.164	-0.044
450	0.088	-0.157	-0.368	-0.17	-0.047
465	0.088	-0.161	-0.374	-0.177	-0.05
480	0.088	-0.157	-0.371	-0.18	-0.05
495	0.088	-0.157	-0.377	-0.183	-0.05
510	0.081	-0.167	-0.381	-0.186	-0.053
525	0.081	-0.161	-0.384	-0.192	-0.053
540	0.081	-0.173	-0.393	-0.196	-0.053
555	0.081	-0.173	-0.393	-0.196	-0.056
570	0.081	-0.17	-0.399	-0.199	-0.056
585	0.081	-0.173	-0.403	-0.205	-0.06
600	0.081	-0.173	-0.399	-0.205	-0.063
615	0.081	-0.173	-0.403	-0.208	-0.063
630	0.081	-0.176	-0.399	-0.208	-0.063
645	0.088	-0.18	-0.406	-0.208	-0.066
660	0.081	-0.183	-0.409	-0.215	-0.066
675	0.075	-0.18	-0.409	-0.215	-0.069
690	0.081	-0.186	-0.412	-0.215	-0.069
705	0.081	-0.189	-0.409	-0.215	-0.066
720	0.081	-0.186	-0.418	-0.218	-0.066
735	0.081	-0.195	-0.422	-0.221	-0.069
750	0.075	-0.189	-0.422	-0.221	-0.072
765	0.075	-0.195	-0.428	-0.221	-0.069
780	0.081	-0.195	-0.425	-0.221	-0.072
795	0.088	-0.192	-0.434	-0.224	-0.072
810	0.081	-0.195	-0.437	-0.224	-0.075
825	0.081	-0.198	-0.431	-0.224	-0.075
840	0.081	-0.195	-0.44	-0.224	-0.075
855	0.081	-0.205	-0.447	-0.224	-0.079
870	0.081	-0.205	-0.444	-0.224	-0.079
885	0.081	-0.208	-0.447	-0.224	-0.082
900	0.081	-0.205	-0.45	-0.224	-0.082
915	0.075	-0.211	-0.447	-0.224	-0.082
930	0.075	-0.214	-0.45	-0.224	-0.085
945	0.075	-0.217	-0.453	-0.224	-0.085
960	0.075	-0.208	-0.453	-0.224	-0.085
975	0.069	-0.214	-0.462	-0.227	-0.091
990	0.063	-0.224	-0.462	-0.227	-0.091
1005	0.063	-0.217	-0.462	-0.224	-0.091
1020	0.063	-0.214	-0.466	-0.227	-0.094
1035	0.056	-0.221	-0.472	-0.227	-0.098
1050	0.05	-0.227	-0.469	-0.227	-0.098
1065	0.05	-0.227	-0.475	-0.227	-0.101
1080	0.056	-0.224	-0.481	-0.23	-0.091
1095	0.075	-0.221	-0.466	-0.227	-0.091
1110	0.075	-0.208	-0.466	-0.227	-0.091

1125	0.025	-0.243	-0.481	-0.23	-0.11
1140	0	-0.255	-0.494	-0.237	-0.123
1155	0.006	-0.249	-0.491	-0.234	-0.11
1170	0.044	-0.233	-0.478	-0.23	-0.107
1185	0.069	-0.224	-0.469	-0.234	-0.098
1200	0.037	-0.24	-0.485	-0.234	-0.113
1215	0.056	-0.23	-0.475	-0.23	-0.101
1230	0.044	-0.233	-0.481	-0.23	-0.11
1245	0.037	-0.236	-0.485	-0.23	-0.101
1260	0.025	-0.249	-0.5	-0.234	-0.123
1275	0.037	-0.243	-0.494	-0.23	-0.113
1290	0	-0.259	-0.5	-0.23	-0.12
1305	0.025	-0.243	-0.478	-0.23	-0.117
1320	-0.012	-0.271	-0.503	-0.234	-0.129
1335	0.025	-0.246	-0.491	-0.23	-0.12
1350	0.037	-0.233	-0.485	-0.23	-0.117
1365	0.031	-0.243	-0.485	-0.23	-0.117
1380	0.006	-0.252	-0.491	-0.23	-0.129
1395	0.025	-0.24	-0.488	-0.23	-0.12
1410	0	-0.268	-0.507	-0.227	-0.126
1425	0.044	-0.233	-0.478	-0.227	-0.12
1440	0.037	-0.23	-0.472	-0.227	-0.123

END

IN-SITU INC. SOFTWARE SERIES

Naples Truck Stop

Input File Name: A:2naples.dat
Output File Name: A:2naples.out
Plot File Name: A:2naples.plt

****
The input/output will be in HYDROLOGY terminology
****

Flow rate	=	2.60 gpm
Number of Observation Wells	=	4
Number of Time-Drawdown Pairs/Well	=	72
Maximum Number of Iterations	=	60
Tolerance of Iteration (Relative)	=	1.00E-03
Angular Frequency Interval	=	15.00 deg

Observation Well Coordinates and Radial Distances Referenced to Pumping Well:

	X (ft)	Y (ft)	R (ft)
Well 1	48.00	.00	48.00
Well 2	17.00	.00	17.00
Well 3	50.00	-20.00	53.85
Well 4	-93.00	.00	93.00

THE "BEST-FIT" TIME-DRAWDOWN MATCH DATA:

Well 1

Transmissivity = 1070.80 ft**2/d
Storage Coefficient = 3.9E-03

Time (min)	Drawdown (ft) Data	Match
15.00	.07	.05
30.00	.07	.07
45.00	.09	.08
60.00	.09	.09
75.00	.10	.10
90.00	.10	.11
105.00	.11	.11
120.00	.11	.12
135.00	.12	.12
150.00	.12	.12
165.00	.12	.13
180.00	.12	.13
195.00	.12	.13
210.00	.13	.14
225.00	.13	.14
240.00	.13	.14
255.00	.14	.14
270.00	.13	.15
285.00	.14	.15
300.00	.14	.15
315.00	.14	.15
330.00	.14	.15
345.00	.14	.16
360.00	.14	.16
375.00	.14	.16
390.00	.15	.16
405.00	.15	.16
420.00	.15	.16
435.00	.15	.16
450.00	.16	.16
465.00	.16	.17
480.00	.16	.17
495.00	.16	.17
510.00	.17	.17
525.00	.17	.17
540.00	.17	.17
555.00	.17	.17
570.00	.17	.17
585.00	.17	.17
600.00	.17	.18
615.00	.17	.18
630.00	.18	.18
645.00	.18	.18
660.00	.18	.18
675.00	.18	.18
690.00	.19	.18
705.00	.19	.18
720.00	.19	.18
735.00	.19	.18
750.00	.19	.18

765.00	.19	.18
780.00	.19	.19
795.00	.19	.19
810.00	.19	.19
825.00	.20	.19
840.00	.20	.19
855.00	.20	.19
870.00	.20	.19
885.00	.21	.19
900.00	.21	.19
915.00	.21	.19
930.00	.21	.19
945.00	.21	.19
960.00	.21	.19
975.00	.21	.19
990.00	.22	.19
1005.00	.22	.19
1020.00	.22	.20
1035.00	.22	.20
1050.00	.22	.20
1065.00	.22	.20
1080.00	.22	.20

Well 2

Transmissivity = 480.07 ft**2/d
Storage Coefficient = 1.2E-02

Time (min)	Drawdown (ft) Data	Match
15.00	.10	.11
30.00	.17	.16
45.00	.22	.20
60.00	.25	.22
75.00	.26	.24
90.00	.27	.25
105.00	.28	.26
120.00	.28	.27
135.00	.30	.28
150.00	.30	.29
165.00	.30	.30
180.00	.31	.31
195.00	.31	.31
210.00	.31	.32
225.00	.32	.32
240.00	.32	.33

255.00	.33	.34
270.00	.33	.34
285.00	.33	.34
300.00	.34	.35
315.00	.34	.35
330.00	.34	.36
345.00	.34	.36
360.00	.35	.36
375.00	.35	.37
390.00	.36	.37
405.00	.36	.37
420.00	.36	.38
435.00	.36	.38
450.00	.37	.38
465.00	.37	.38
480.00	.37	.39
495.00	.38	.39
510.00	.38	.39
525.00	.38	.39
540.00	.39	.40
555.00	.39	.40
570.00	.40	.40
585.00	.40	.40
600.00	.40	.41
615.00	.40	.41
630.00	.40	.41
645.00	.41	.41
660.00	.41	.41
675.00	.41	.42
690.00	.41	.42
705.00	.41	.42
720.00	.42	.42
735.00	.42	.42
750.00	.42	.42
765.00	.43	.43
780.00	.43	.43
795.00	.43	.43
810.00	.44	.43
825.00	.44	.43
840.00	.44	.43
855.00	.44	.44
870.00	.44	.44
885.00	.45	.44
900.00	.45	.44
915.00	.45	.44
930.00	.45	.44
945.00	.45	.44
960.00	.45	.44
975.00	.46	.45
990.00	.46	.45
1005.00	.46	.45
1020.00	.47	.45
1035.00	.47	.45
1050.00	.47	.45
1065.00	.47	.45
1080.00	.48	.45

Well 3

Transmissivity = 663.86 ft**2/d
Storage Coefficient = 9.1E-03

Time (min)	Drawdown (ft) Data	Match
15.00	.04	.01
30.00	.05	.04
45.00	.06	.05
60.00	.07	.07
75.00	.08	.08
90.00	.08	.09
105.00	.09	.09
120.00	.09	.10
135.00	.10	.11
150.00	.10	.11
165.00	.11	.12
180.00	.11	.12
195.00	.11	.13
210.00	.12	.13
225.00	.12	.13
240.00	.12	.14
255.00	.13	.14
270.00	.13	.14
285.00	.14	.15
300.00	.14	.15
315.00	.14	.15
330.00	.14	.16
345.00	.14	.16
360.00	.15	.16
375.00	.15	.16
390.00	.16	.17
405.00	.16	.17
420.00	.16	.17
435.00	.16	.17
450.00	.17	.17
465.00	.18	.18
480.00	.18	.18
495.00	.18	.18
510.00	.19	.18
525.00	.19	.18
540.00	.20	.19
555.00	.20	.19
570.00	.20	.19
585.00	.20	.19
600.00	.20	.19

615.00	.21	.19
630.00	.21	.19
645.00	.21	.20
660.00	.22	.20
675.00	.22	.20
690.00	.22	.20
705.00	.22	.20
720.00	.22	.20
735.00	.22	.20
750.00	.22	.20
765.00	.22	.21
780.00	.22	.21
795.00	.22	.21
810.00	.22	.21
825.00	.22	.21
840.00	.22	.21
855.00	.22	.21
870.00	.22	.21
885.00	.22	.21
900.00	.22	.22
915.00	.22	.22
930.00	.22	.22
945.00	.22	.22
960.00	.22	.22
975.00	.23	.22
990.00	.23	.22
1005.00	.23	.22
1020.00	.23	.22
1035.00	.23	.22
1050.00	.23	.22
1065.00	.23	.23
1080.00	.23	.23

Well 4

Transmissivity = 770.28 ft**2/d
Storage Coefficient = 3.2E-02

Time (min)	Drawdown (ft) Data	Match
15.00	.00	--
30.00	.00	--
45.00	.00	.00
60.00	.01	.00
75.00	.01	.00
90.00	.01	.01

105.00	.01	.01
120.00	.01	.01
135.00	.01	.01
150.00	.01	.01
165.00	.01	.02
180.00	.02	.02
195.00	.02	.02
210.00	.02	.02
225.00	.03	.03
240.00	.03	.03
255.00	.03	.03
270.00	.03	.03
285.00	.03	.03
300.00	.03	.03
315.00	.03	.04
330.00	.03	.04
345.00	.04	.04
360.00	.04	.04
375.00	.04	.04
390.00	.04	.04
405.00	.04	.04
420.00	.04	.05
435.00	.04	.05
450.00	.05	.05
465.00	.05	.05
480.00	.05	.05
495.00	.05	.05
510.00	.05	.05
525.00	.05	.06
540.00	.05	.06
555.00	.06	.06
570.00	.06	.06
585.00	.06	.06
600.00	.06	.06
615.00	.06	.06
630.00	.06	.06
645.00	.07	.06
660.00	.07	.06
675.00	.07	.07
690.00	.07	.07
705.00	.07	.07
720.00	.07	.07
735.00	.07	.07
750.00	.07	.07
765.00	.07	.07
780.00	.07	.07
795.00	.07	.07
810.00	.08	.07
825.00	.08	.07
840.00	.08	.08
855.00	.08	.08
870.00	.08	.08
885.00	.08	.08
900.00	.08	.08
915.00	.08	.08
930.00	.09	.08
945.00	.09	.08
960.00	.09	.08

975.00	.09	.08
990.00	.09	.08
1005.00	.09	.08
1020.00	.09	.08
1035.00	.10	.08
1050.00	.10	.09
1065.00	.10	.09
1080.00	.11	.09

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A Q T E S O L V

A Program for

Automatic Estimation of Aquifer Coefficients

From Aquifer Test Data

By:

Glenn M. Duffield
and
James O. Rumbaugh, III

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Reston, VA 22091

(703) 476 - 0335

A Q T E S O L V is a user-friendly program designed to analyze data from aquifer tests automatically. Aquifer coefficients for a variety of aquifer test conditions can be estimated by A Q T E S O L V , including the following:

- confined aquifers, unconfined aquifers, and leaky aquifers
- pumping tests, injection tests, recovery tests, and slug tests

Features:

- Interactive, menu-driven program design
- Nonlinear least-squares estimation of aquifer coefficients
- Statistical analysis of results
- Complete graphical display of results

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A Q T E S O L V R E S U L T S
Version 1.10

04/19/94 22:11:07

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TEST DESCRIPTION

Data set........... napls2.dat
Data set title..... Naples Truck Stop MW-11

Knowns and Constants:
- No. of data points.................. 47
- Pumping rate........................ 0.3475
- Radius (distance) to obs. well...... 48
- Aquifer saturated thickness......... 9

==

ANALYTICAL METHOD

Theis (Unconfined Aquifer)

==

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

		Estimate		Std. Error
T	=	6.6656E-001	+/-	3.2122E-002
S	=	5.5011E-003	+/-	7.9117E-004

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
- Number of residuals............... 47
- Number of estimated parameters.... 2
- Degrees of freedom................ 45
- Residual mean..................... 0.0002218
- Residual standard deviation....... 0.01102
- Residual variance................. 0.0001215

Model Residuals:

Time	Observed	Calculated	Residual	Weight
15	0.066	0.035974	0.030026	1

30	0.072	0.058999	0.013001	1
45	0.088	0.073877	0.014123	1
60	0.094	0.084862	0.0091376	1
75	0.097	0.093572	0.0034283	1
90	0.101	0.10079	0.0002122	1
105	0.107	0.10695	5.1387E-005	1
120	0.11	0.11232	-0.002324	1
135	0.116	0.11709	-0.001092	1
180	0.123	0.12883	-0.0058276	1
210	0.129	0.13516	-0.0061611	1
240	0.132	0.14067	-0.0086691	1
255	0.135	0.14318	-0.0081759	1
285	0.138	0.14778	-0.009784	1
300	0.138	0.14991	-0.011913	1
315	0.138	0.15194	-0.01394	1
330	0.138	0.15387	-0.015875	1
345	0.142	0.15572	-0.013725	1
360	0.145	0.1575	-0.012498	1
390	0.148	0.16084	-0.012835	1
405	0.148	0.16241	-0.014411	1
420	0.151	0.16393	-0.01293	1
450	0.157	0.16681	-0.009814	1
465	0.161	0.16819	-0.0071858	1
510	0.167	0.17205	-0.005054	1
540	0.173	0.17445	-0.00145	1
555	0.173	0.1756	-0.0025992	1
585	0.173	0.17781	-0.0048085	1
600	0.173	0.17887	-0.0058715	1
615	0.173	0.17991	-0.0069086	1
630	0.176	0.18092	-0.004921	1
645	0.18	0.18191	-0.0019099	1
660	0.183	0.18288	0.0001237	1
690	0.186	0.18475	0.0012543	1
705	0.189	0.18565	0.0033495	1
735	0.195	0.1874	0.0075957	1
765	0.195	0.18909	0.0059113	1
780	0.195	0.18991	0.0050934	1
810	0.195	0.1915	0.0035033	1
825	0.198	0.19227	0.00573	1
855	0.205	0.19378	0.011224	1
870	0.205	0.19451	0.010491	1
885	0.208	0.19523	0.01277	1
915	0.211	0.19664	0.014364	1
930	0.214	0.19732	0.016677	1
945	0.217	0.198	0.019002	1
990	0.224	0.19996	0.024038	1

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RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

	Estimate
T =	6.1142E-001
S =	5.1191E-003

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A Q T E S O L V   R E S U L T S
Version 1.10

04/19/94 22:12:13

==

TEST DESCRIPTION

Data set........... napls2.dat
Data set title..... Naples Truck Stop MW-11

Knowns and Constants:
No. of data points.................. 47
Pumping rate........................ 0.3475
Radius (distance) to obs. well...... 48
Aquifer saturated thickness......... 9

==

ANALYTICAL METHOD

Cooper-Jacob (Unconfined Aquifer)

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RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate		Std. Error
T =	7.1449E-001	+/-	3.2107E-002
S =	4.3647E-003	+/-	6.2192E-004

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
Number of residuals............... 47
Number of estimated parameters.... 2
Degrees of freedom................ 45
Residual mean..................... -1.169E-007
Residual standard deviation....... 0.01174
Residual variance................. 0.0001379

Model Residuals:

Time	Observed	Calculated	Residual	Weight
15	0.066	0.033848	0.032152	1

30	0.072	0.060822	0.011178	1
45	0.088	0.076639	0.011361	1
60	0.094	0.087878	0.0061222	1
75	0.097	0.096605	0.00039476	1
90	0.101	0.10374	-0.0027424	1
105	0.107	0.10978	-0.0027813	1
120	0.11	0.11502	-0.0050158	1
135	0.116	0.11964	-0.0036354	1
180	0.123	0.13093	-0.007929	1
210	0.129	0.13699	-0.0079864	1
240	0.132	0.14224	-0.010237	1
255	0.135	0.14462	-0.0096217	1
285	0.138	0.149	-0.010999	1
300	0.138	0.15102	-0.013018	1
315	0.138	0.15294	-0.014939	1
330	0.138	0.15477	-0.016771	1
345	0.142	0.15652	-0.014522	1
360	0.145	0.1582	-0.013199	1
390	0.148	0.16135	-0.013354	1
405	0.148	0.16284	-0.014841	1
420	0.151	0.16428	-0.013275	1
450	0.157	0.167	-0.009996	1
465	0.161	0.16829	-0.0072894	1
510	0.167	0.17193	-0.0049341	1
540	0.173	0.17419	-0.0011902	1
555	0.173	0.17527	-0.0022718	1
585	0.173	0.17735	-0.0043504	1
600	0.173	0.17835	-0.0053502	1
615	0.173	0.17933	-0.0063254	1
630	0.176	0.18028	-0.0042773	1
645	0.18	0.18121	-0.0012068	1
660	0.183	0.18212	0.00088491	1
690	0.186	0.18387	0.0021284	1
705	0.189	0.18472	0.0042785	1
735	0.195	0.18637	0.0086314	1
765	0.195	0.18795	0.0070499	1
780	0.195	0.18872	0.0062821	1
810	0.195	0.19021	0.0047898	1
825	0.198	0.19094	0.0070641	1
855	0.205	0.19235	0.012651	1
870	0.205	0.19304	0.011963	1
885	0.208	0.19371	0.014287	1
915	0.211	0.19503	0.015968	1
930	0.214	0.19568	0.018325	1
945	0.217	0.19631	0.020692	1
990	0.224	0.19815	0.02585	1

==========

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

	Estimate
T =	7.1449E-001
S =	4.3647E-003

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A Q T E S O L V

A Program for

Automatic Estimation of Aquifer Coefficients

From Aquifer Test Data

By:

Glenn M. Duffield
and
James O. Rumbaugh, III

Geraghty & Miller Modeling Group
1895 Preston White Drive, Suite 301
Reston, VA 22091

(703) 476 - 0335

A Q T E S O L V is a user-friendly program designed to analyze data from aquifer tests automatically. Aquifer coefficients for a variety of aquifer test conditions can be estimated by A Q T E S O L V , including the following:

- confined aquifers, unconfined aquifers, and leaky aquifers
- pumping tests, injection tests, recovery tests, and slug tests

Features:

- Interactive, menu-driven program design
- Nonlinear least-squares estimation of aquifer coefficients
- Statistical analysis of results
- Complete graphical display of results

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A Q T E S O L V R E S U L T S
Version 1.10

04/19/94 22:13:26

==

TEST DESCRIPTION

Data set........... napls3.dat
Data set title..... Naples Truck Stop MW-12

Knowns and Constants:
- No. of data points.................. 57
- Pumping rate........................ 0.3475
- Radius (distance) to obs. well...... 17
- Aquifer saturated thickness......... 9

==

ANALYTICAL METHOD

Theis (Unconfined Aquifer)

==

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

		Estimate		Std. Error
T	=	3.5929E-001	+/-	8.1518E-003
S	=	9.9380E-003	+/-	8.4593E-004

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
- Number of residuals............... 57
- Number of estimated parameters.... 2
- Degrees of freedom................ 55
- Residual mean..................... -5.374E-006
- Residual standard deviation....... 0.0114
- Residual variance................. 0.00013

Model Residuals:

Time	Observed	Calculated	Residual	Weight
15	0.1	0.12145	-0.021455	1

30	0.173	0.17072	0.0022763	1
45	0.223	0.20089	0.022109	1
60	0.245	0.22271	0.022292	1
75	0.261	0.23982	0.021183	1
90	0.273	0.2539	0.019102	1
105	0.283	0.26587	0.017134	1
120	0.283	0.27628	0.0067242	1
135	0.296	0.28549	0.010513	1
150	0.299	0.29375	0.0052509	1
165	0.299	0.30124	-0.0022397	1
180	0.305	0.30809	-0.0030913	1
195	0.311	0.3144	-0.0034048	1
210	0.311	0.32026	-0.009259	1
225	0.318	0.32572	-0.0077163	1
240	0.321	0.33083	-0.0098274	1
255	0.33	0.33563	-0.0056339	1
270	0.333	0.34017	-0.0071701	1
285	0.333	0.34446	-0.011465	1
300	0.34	0.34854	-0.0085428	1
315	0.34	0.35242	-0.012425	1
330	0.343	0.35613	-0.013129	1
345	0.343	0.35967	-0.016671	1
360	0.355	0.36306	-0.0080642	1
375	0.355	0.36632	-0.011321	1
390	0.359	0.36945	-0.010452	1
405	0.359	0.37247	-0.013466	1
420	0.359	0.37537	-0.016373	1
450	0.368	0.38089	-0.01289	1
465	0.374	0.38351	-0.0095143	1
495	0.377	0.38852	-0.011521	1
510	0.381	0.39091	-0.0099131	1
525	0.384	0.39324	-0.0092368	1
540	0.393	0.3955	-0.0024959	1
555	0.393	0.39769	-0.0046938	1
570	0.399	0.39983	-0.0008339	1
585	0.403	0.40192	0.0010809	1
615	0.403	0.40594	-0.0029357	1
645	0.406	0.40976	-0.0037632	1
660	0.409	0.41161	-0.0026116	1
675	0.409	0.41342	-0.0044189	1
690	0.412	0.41519	-0.0031869	1
720	0.418	0.41861	-0.00061197	1
735	0.422	0.42027	0.001728	1
750	0.422	0.4219	0.00010119	1
765	0.428	0.42349	0.0045062	1
795	0.434	0.42659	0.0074068	1
810	0.437	0.4281	0.0089002	1
840	0.44	0.43103	0.0089679	1
855	0.447	0.43246	0.01454	1
885	0.447	0.43524	0.011758	1
900	0.45	0.4366	0.013402	1
930	0.45	0.43925	0.010755	1
945	0.453	0.44054	0.012463	1
960	0.453	0.44181	0.011191	1
975	0.462	0.44306	0.018938	1
990	0.462	0.4443	0.017705	1

==

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

		Estimate
T	=	3.5929E-001
S	=	9.9380E-003

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A Q T E S O L V R E S U L T S
Version 1.10

04/19/94 22:13:57

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TEST DESCRIPTION

Data set........... napls3.dat
Data set title..... Naples Truck Stop MW-12

Knowns and Constants:
No. of data points................... 57
Pumping rate......................... 0.3475
Radius (distance) to obs. well...... 17
Aquifer saturated thickness......... 9

==

ANALYTICAL METHOD

Cooper-Jacob (Unconfined Aquifer)

==

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate		Std. Error
T =	3.6528E-001	+/-	7.6598E-003
S =	9.2691E-003	+/-	7.3563E-004

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
Number of residuals................ 57
Number of estimated parameters.... 2
Degrees of freedom................ 55
Residual mean..................... -2.07E-007
Residual standard deviation....... 0.0114
Residual variance................. 0.0001299

Model Residuals:

Time	Observed	Calculated	Residual	Weight
15	0.1	0.1162	-0.016196	1

30	0.173	0.16953	0.0034737	1
45	0.223	0.20087	0.022128	1
60	0.245	0.22318	0.02182	1
75	0.261	0.24052	0.020477	1
90	0.273	0.25472	0.018282	1
105	0.283	0.26674	0.016261	1
120	0.283	0.27716	0.0058357	1
135	0.296	0.28637	0.0096292	1
150	0.299	0.29461	0.0043855	1
165	0.299	0.30208	-0.0030786	1
180	0.305	0.3089	-0.0038984	1
195	0.311	0.31518	-0.0041767	1
210	0.311	0.32099	-0.0099935	1
225	0.318	0.32641	-0.0084124	1
240	0.321	0.33148	-0.010485	1
255	0.33	0.33625	-0.0062517	1
270	0.333	0.34075	-0.0077487	1
285	0.333	0.345	-0.012005	1
300	0.34	0.34904	-0.0090443	1
315	0.34	0.35289	-0.012888	1
330	0.343	0.35656	-0.013555	1
345	0.343	0.36006	-0.017061	1
360	0.355	0.36342	-0.0084182	1
375	0.355	0.36664	-0.01164	1
390	0.359	0.36974	-0.010736	1
405	0.359	0.37272	-0.013717	1
420	0.359	0.37559	-0.01659	1
450	0.368	0.38104	-0.013043	1
465	0.374	0.38364	-0.0096359	1
495	0.377	0.38858	-0.011582	1
510	0.381	0.39094	-0.0099447	1
525	0.384	0.39324	-0.0092396	1
540	0.393	0.39547	-0.0024703	1
555	0.393	0.39764	-0.0046405	1
570	0.399	0.39975	-0.0007534	1
585	0.403	0.40181	0.0011881	1
615	0.403	0.40578	-0.0027764	1
645	0.406	0.40955	-0.0035538	1
660	0.409	0.41138	-0.0023777	1
675	0.409	0.41316	-0.004161	1
690	0.412	0.41491	-0.0029054	1
720	0.418	0.41828	-0.00028432	1
735	0.422	0.41992	0.0020782	1
750	0.422	0.42153	0.00047346	1
765	0.428	0.4231	0.0049002	1
795	0.434	0.42616	0.0078434	1
810	0.437	0.42764	0.0093576	1
840	0.44	0.43053	0.0094661	1
855	0.447	0.43194	0.015058	1
885	0.447	0.43468	0.012315	1
900	0.45	0.43602	0.013978	1
930	0.45	0.43863	0.011368	1
945	0.453	0.43991	0.013095	1
960	0.453	0.44116	0.011841	1
975	0.462	0.44239	0.019606	1
990	0.462	0.44361	0.01839	1

==

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

		Estimate
T	=	3.6528E-001
S	=	9.2691E-003

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A Q T E S O L V

A Program for Automatic Estimation of Aquifer Coefficients From Aquifer Test Data

By:

Glenn M. Duffield
and
James O. Rumbaugh, III

Geraghty & Miller Modeling Group
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- o confined aquifers, unconfined aquifers, and leaky aquifers
- o pumping tests, injection tests, recovery tests, and slug tests

Features:

- o Interactive, menu-driven program design
- o Nonlinear least-squares estimation of aquifer coefficients
- o Statistical analysis of results
- o Complete graphical display of results

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A Q T E S O L V R E S U L T S
Version 1.10

04/19/94 22:13:26

==

TEST DESCRIPTION

Data set........... napls3.dat
Data set title..... Naples Truck Stop MW-12

Knowns and Constants:
- No. of data points.................. 57
- Pumping rate........................ 0.3475
- Radius (distance) to obs. well...... 17
- Aquifer saturated thickness......... 9

==

ANALYTICAL METHOD

Theis (Unconfined Aquifer)

==

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate		Std. Error
T =	3.5929E-001	+/-	8.1518E-003
S =	9.9380E-003	+/-	8.4593E-004

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
- Number of residuals............... 57
- Number of estimated parameters.... 2
- Degrees of freedom................ 55
- Residual mean..................... -5.374E-006
- Residual standard deviation....... 0.0114
- Residual variance................. 0.00013

Model Residuals:

Time	Observed	Calculated	Residual	Weight
15	0.1	0.12145	-0.021455	1

30	0.173	0.17072	0.0022763	1
45	0.223	0.20089	0.022109	1
60	0.245	0.22271	0.022292	1
75	0.261	0.23982	0.021183	1
90	0.273	0.2539	0.019102	1
105	0.283	0.26587	0.017134	1
120	0.283	0.27628	0.0067242	1
135	0.296	0.28549	0.010513	1
150	0.299	0.29375	0.0052509	1
165	0.299	0.30124	-0.0022397	1
180	0.305	0.30809	-0.0030913	1
195	0.311	0.3144	-0.0034048	1
210	0.311	0.32026	-0.009259	1
225	0.318	0.32572	-0.0077163	1
240	0.321	0.33083	-0.0098274	1
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270	0.333	0.34017	-0.0071701	1
285	0.333	0.34446	-0.011465	1
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345	0.343	0.35967	-0.016671	1
360	0.355	0.36306	-0.0080642	1
375	0.355	0.36632	-0.011321	1
390	0.359	0.36945	-0.010452	1
405	0.359	0.37247	-0.013466	1
420	0.359	0.37537	-0.016373	1
450	0.368	0.38089	-0.01289	1
465	0.374	0.38351	-0.0095143	1
495	0.377	0.38852	-0.011521	1
510	0.381	0.39091	-0.0099131	1
525	0.384	0.39324	-0.0092368	1
540	0.393	0.3955	-0.0024959	1
555	0.393	0.39769	-0.0046938	1
570	0.399	0.39983	-0.0008339	1
585	0.403	0.40192	0.0010809	1
615	0.403	0.40594	-0.0029357	1
645	0.406	0.40976	-0.0037632	1
660	0.409	0.41161	-0.0026116	1
675	0.409	0.41342	-0.0044189	1
690	0.412	0.41519	-0.0031869	1
720	0.418	0.41861	-0.00061197	1
735	0.422	0.42027	0.001728	1
750	0.422	0.4219	0.00010119	1
765	0.428	0.42349	0.0045062	1
795	0.434	0.42659	0.0074068	1
810	0.437	0.4281	0.0089002	1
840	0.44	0.43103	0.0089679	1
855	0.447	0.43246	0.01454	1
885	0.447	0.43524	0.011758	1
900	0.45	0.4366	0.013402	1
930	0.45	0.43925	0.010755	1
945	0.453	0.44054	0.012463	1
960	0.453	0.44181	0.011191	1
975	0.462	0.44306	0.018938	1
990	0.462	0.4443	0.017705	1

==

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

```
          Estimate
  T  =   3.5929E-001
  S  =   9.9380E-003
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A Q T E S O L V R E S U L T S

Version 1.10

04/19/94 22:13:57

TEST DESCRIPTION

Data set........... napls3.dat
Data set title..... Naples Truck Stop MW-12

Knowns and Constants:
No. of data points.................. 57
Pumping rate........................ 0.3475
Radius (distance) to obs. well...... 17
Aquifer saturated thickness......... 9

ANALYTICAL METHOD

Cooper-Jacob (Unconfined Aquifer)

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate		Std. Error
T =	3.6528E-001	+/-	7.6598E-003
S =	9.2691E-003	+/-	7.3563E-004

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
Number of residuals............... 57
Number of estimated parameters.... 2
Degrees of freedom................ 55
Residual mean..................... -2.07E-007
Residual standard deviation....... 0.0114
Residual variance................. 0.0001299

Model Residuals:

Time	Observed	Calculated	Residual	Weight
15	0.1	0.1162	-0.016196	1

30	0.173	0.16953	0.0034737	1
45	0.223	0.20087	0.022128	1
60	0.245	0.22318	0.02182	1
75	0.261	0.24052	0.020477	1
90	0.273	0.25472	0.018282	1
105	0.283	0.26674	0.016261	1
120	0.283	0.27716	0.0058357	1
135	0.296	0.28637	0.0096292	1
150	0.299	0.29461	0.0043855	1
165	0.299	0.30208	-0.0030786	1
180	0.305	0.3089	-0.0038984	1
195	0.311	0.31518	-0.0041767	1
210	0.311	0.32099	-0.0099935	1
225	0.318	0.32641	-0.0084124	1
240	0.321	0.33148	-0.010485	1
255	0.33	0.33625	-0.0062517	1
270	0.333	0.34075	-0.0077487	1
285	0.333	0.345	-0.012005	1
300	0.34	0.34904	-0.0090443	1
315	0.34	0.35289	-0.012888	1
330	0.343	0.35656	-0.013555	1
345	0.343	0.36006	-0.017061	1
360	0.355	0.36342	-0.0084182	1
375	0.355	0.36664	-0.01164	1
390	0.359	0.36974	-0.010736	1
405	0.359	0.37272	-0.013717	1
420	0.359	0.37559	-0.01659	1
450	0.368	0.38104	-0.013043	1
465	0.374	0.38364	-0.0096359	1
495	0.377	0.38858	-0.011582	1
510	0.381	0.39094	-0.0099447	1
525	0.384	0.39324	-0.0092396	1
540	0.393	0.39547	-0.0024703	1
555	0.393	0.39764	-0.0046405	1
570	0.399	0.39975	-0.0007534	1
585	0.403	0.40181	0.0011881	1
615	0.403	0.40578	-0.0027764	1
645	0.406	0.40955	-0.0035538	1
660	0.409	0.41138	-0.0023777	1
675	0.409	0.41316	-0.004161	1
690	0.412	0.41491	-0.0029054	1
720	0.418	0.41828	-0.00028432	1
735	0.422	0.41992	0.0020782	1
750	0.422	0.42153	0.00047346	1
765	0.428	0.4231	0.0049002	1
795	0.434	0.42616	0.0078434	1
810	0.437	0.42764	0.0093576	1
840	0.44	0.43053	0.0094661	1
855	0.447	0.43194	0.015058	1
885	0.447	0.43468	0.012315	1
900	0.45	0.43602	0.013978	1
930	0.45	0.43863	0.011368	1
945	0.453	0.43991	0.013095	1
960	0.453	0.44116	0.011841	1
975	0.462	0.44239	0.019606	1
990	0.462	0.44361	0.01839	1

```
================================================================================
                       RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

           Estimate
   T  =   3.6528E-001
   S  =   9.2691E-003

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A Q T E S O L V

A Program for

Automatic Estimation of Aquifer Coefficients

From Aquifer Test Data

By:

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A Q T E S O L V is a user-friendly program designed to analyze data from aquifer tests automatically. Aquifer coefficients for a variety of aquifer test conditions can be estimated by A Q T E S O L V , including the following:

- o confined aquifers, unconfined aquifers, and leaky aquifers
- o pumping tests, injection tests, recovery tests, and slug tests

Features:

- o Interactive, menu-driven program design
- o Nonlinear least-squares estimation of aquifer coefficients
- o Statistical analysis of results
- o Complete graphical display of results

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A Q T E S O L V R E S U L T S
Version 1.10

04/19/94 22:19:08

==

TEST DESCRIPTION

Data set........... napls5.dat
Data set title..... Naples Truck Stop RW-2

Knowns and Constants:
   No. of data points.................. 61
   Pumping rate........................ 0.3475
   Radius (distance) to obs. well...... 93
   Aquifer saturated thickness......... 9

==

ANALYTICAL METHOD

Theis (Unconfined Aquifer)

==

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

		Estimate		Std. Error
T	=	4.5388E-001	+/-	1.0911E-002
S	=	3.3304E-002	+/-	3.2995E-004

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
   Number of residuals.............. 61
   Number of estimated parameters.... 2
   Degrees of freedom............... 59
   Residual mean.................... 0.000316
   Residual standard deviation....... 0.002144
   Residual variance................ 4.595E-006

Model Residuals:

Time	Observed	Calculated	Residual	Weight
45	0.003	0.00041138	0.0025886	1

60	0.006	0.0012566	0.0047434	1
75	0.006	0.0025425	0.0034575	1
90	0.009	0.0041576	0.0048424	1
105	0.009	0.0059969	0.0030031	1
120	0.012	0.0079787	0.0040213	1
135	0.012	0.010044	0.0019557	1
150	0.012	0.012152	-0.0001521	1
165	0.015	0.014273	0.0007266	1
180	0.018	0.016388	0.0016117	1
195	0.018	0.018483	-0.00048325	1
210	0.022	0.020549	0.0014509	1
225	0.025	0.02258	0.0024202	1
240	0.025	0.024572	0.00042849	1
255	0.025	0.026522	-0.001522	1
270	0.031	0.02843	0.0025699	1
285	0.031	0.030295	0.00070459	1
300	0.031	0.032118	-0.0011181	1
315	0.034	0.033899	0.00010124	1
330	0.034	0.035638	-0.0016382	1
345	0.037	0.037337	-0.00033735	1
360	0.037	0.038997	-0.0019974	1
375	0.041	0.04062	0.00038047	1
390	0.041	0.042205	-0.0012049	1
405	0.044	0.043755	0.00024514	1
420	0.044	0.045271	-0.0012705	1
435	0.044	0.046753	-0.0027531	1
450	0.047	0.048204	-0.0012038	1
465	0.05	0.049624	0.00037623	1
480	0.05	0.051014	-0.0010141	1
495	0.05	0.052376	-0.0023758	1
510	0.053	0.05371	-0.00071003	1
525	0.053	0.055018	-0.0020177	1
540	0.053	0.0563	-0.0032996	1
555	0.056	0.057557	-0.0015569	1
570	0.056	0.05879	-0.0027903	1
585	0.06	0.060001	-6.8875E-007	1
600	0.063	0.061189	0.0018112	1
615	0.063	0.062355	0.00064457	1
630	0.063	0.063501	-0.00050127	1
645	0.066	0.064627	0.001373	1
660	0.066	0.065733	0.00026665	1
675	0.069	0.066821	0.0021791	1
690	0.069	0.06789	0.0011098	1
735	0.069	0.070995	-0.0019946	1
750	0.072	0.071997	3.4375E-006	1
780	0.072	0.073954	-0.0019543	1
795	0.072	0.074911	-0.002911	1
810	0.075	0.075853	-0.00085344	1
825	0.075	0.076782	-0.001782	1
840	0.075	0.077697	-0.0026972	1
855	0.079	0.078599	0.00040072	1
870	0.079	0.079489	-0.00048866	1
885	0.082	0.080366	0.0016343	1
900	0.082	0.081231	0.00076934	1
915	0.082	0.082084	-8.3927E-005	1
930	0.085	0.082926	0.0020742	1
945	0.085	0.083757	0.0012435	1
960	0.085	0.084576	0.00042352	1

975	0.091	0.085386	0.0056141	1
990	0.091	0.086185	0.004815	1

==

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

		Estimate
T	=	3.8189E-001
S	=	2.7227E-002

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<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

A Q T E S O L V R E S U L T S
Version 1.10

04/19/94 22:19:29

==
TEST DESCRIPTION

Data set........... napls5.dat
Data set title..... Naples Truck Stop RW-2

Knowns and Constants:
No. of data points.................. 61
Pumping rate........................ 0.3475
Radius (distance) to obs. well...... 93
Aquifer saturated thickness......... 9

==
ANALYTICAL METHOD

Cooper-Jacob (Unconfined Aquifer)

==
RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

		Estimate		Std. Error
T	=	8.6271E-001	+/-	3.3182E-002
S	=	1.9674E-002	+/-	6.9896E-004

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
Number of residuals............... 61
Number of estimated parameters.... 2
Degrees of freedom................ 59
Residual mean..................... -2.767E-008
Residual standard deviation....... 0.00724
Residual variance................. 5.242E-005

Model Residuals:

Time	Observed	Calculated	Residual	Weight
45	0.003	-0.021412	0.024412	1

60	0.006	-0.012206	0.018206	1
75	0.006	-0.0050593	0.011059	1
90	0.009	0.00078452	0.0082155	1
105	0.009	0.0057283	0.0032717	1
120	0.012	0.010013	0.001987	1
135	0.012	0.013794	-0.0017941	1
150	0.012	0.017178	-0.0051778	1
165	0.015	0.02024	-0.0052397	1
180	0.018	0.023036	-0.005036	1
195	0.018	0.025609	-0.0076091	1
210	0.022	0.027992	-0.0059921	1
225	0.025	0.030211	-0.0052112	1
240	0.025	0.032287	-0.0072874	1
255	0.025	0.034238	-0.0092383	1
270	0.031	0.036078	-0.0050779	1
285	0.031	0.037818	-0.0068184	1
300	0.031	0.03947	-0.00847	1
315	0.034	0.041041	-0.0070412	1
330	0.034	0.04254	-0.0085396	1
345	0.037	0.043972	-0.0069716	1
360	0.037	0.045343	-0.0083428	1
375	0.041	0.046658	-0.0056583	1
390	0.041	0.047922	-0.0069223	1
405	0.044	0.049139	-0.0051388	1
420	0.044	0.050311	-0.0063112	1
435	0.044	0.051443	-0.0074426	1
450	0.047	0.052536	-0.0055358	1
465	0.05	0.053593	-0.0035933	1
480	0.05	0.054617	-0.0046173	1
495	0.05	0.05561	-0.0056099	1
510	0.053	0.056573	-0.003573	1
525	0.053	0.057508	-0.0045082	1
540	0.053	0.058417	-0.0054173	1
555	0.056	0.059301	-0.0033014	1
570	0.056	0.060162	-0.0041621	1
585	0.06	0.061001	-0.0010005	1
600	0.063	0.061818	0.0011822	1
615	0.063	0.062615	0.00038506	1
630	0.063	0.063393	-0.00039294	1
645	0.066	0.064153	0.0018473	1
660	0.066	0.064895	0.0011049	1
675	0.069	0.065621	0.0033792	1
690	0.069	0.066331	0.0026694	1
735	0.069	0.068371	0.0006286	1
750	0.072	0.069024	0.0029759	1
780	0.072	0.070291	0.0017087	1
795	0.072	0.070907	0.0010932	1
810	0.075	0.071511	0.0034892	1
825	0.075	0.072104	0.0028962	1
840	0.075	0.072686	0.0023138	1
855	0.079	0.073258	0.0057417	1
870	0.079	0.07382	0.0051796	1
885	0.082	0.074373	0.007627	1
900	0.082	0.074916	0.0070836	1
915	0.082	0.075451	0.0065493	1
930	0.085	0.075976	0.0090235	1
945	0.085	0.076494	0.0085062	1
960	0.085	0.077003	0.0079969	1

975	0.091	0.077504	0.013496	1
990	0.091	0.077998	0.013002	1

==

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

		Estimate
T	=	8.6271E-001
S	=	1.9674E-002

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Vacuum Enhanced Pumping
Estimated Hydrocarbon Removal Rates

Naples Truckstop
Vernal, Utah

IT Project No. 519063

Air Stream

Average Flow Rate (from Extraction Well) @ 03:30 and 14:30

Q = 19.6 ft^3/minute @14:30
Q = 24.0 ft^3/minute @03:30
Q_A = 24.0 ft^3/minute

Influent Concentrations (AS-1) Collected @03:30 on 3/25/94

Total BTEX =	590.6 ppmv		
Benzene:	430 ppmv	430 / 590.6 =	73%
Toluene	94 ppmv	94 / 590.6 =	16%
Ethyl Benzene	19 ppmv	19 / 590.6 =	3%
Total Xylenes	47.6 ppmv	47.6 / 590.6 =	8%
			100%

Influent Concentrations (AS-2) Collected @14:30 on 3/25/94

Total BTEX =	629.9 ppmv		
Benzene:	450 ppmv	450 / 629.9 =	72%
Toluene	110 ppmv	110 / 629.9 =	17%
Ethyl Benzene	20 ppmv	20 / 629.9 =	3%
Total Xylenes	49.9 ppmv	49.9 / 629.9 =	8%
			100%

Average Influent Concentrations

Total BTEX =	610.3 ppmv
Benzene:	440 ppmv
Toluene	102 ppmv
Ethyl Benzene	19.5 ppmv
Total Xylenes	48.8 ppmv

Emission Rate: Flow Rate x Molecular Weight x Molar Volume x Concentration

Benzene: [24 ft^3/min.] [78 lb/lb-mol] [1 lb-mol/385 ft^3] [60 min/hr] [440 ppm] [10^{-6}]= 0.128 lb/hr

Toluene: [24 ft^3/min.] [92 lb/lb-mol] [1 lb-mol/385 ft^3] [60 min/hr] [102 ppm] [10^{-6}]= 0.035 lb/hr

Ethylbenzene: [24 ft^3/min.] [106 lb/lb-mol] [1 lb-mol/385 ft^3] [60 min/hr] [19.5 ppm] [10^{-6}]= 0.008 lb/hr

Xylenes: [24 ft^3/min.] [106 lb/lb-mol] [1 lb-mol/385 ft^3] [60 min/hr] [48.8 ppm] [10^{-6}]= 0.019 lb/hr

Total BTEX: 0.190 lb/hr

Based on the average flow rate and influent concentration seen during the pilot test, the average amount of total BTEX discharged to the atmosphere was 0.190 pounds of BTEX per hour.

Hydrocarbon Removal: Emission Rates x 24 Hour Pilot Test

Benzene:	0.128 lb/hr x 24 hr = 3.07 lb
Toluene:	0.035 lb/hr x 24 hr = 0.84 lb
EthylBenzene:	0.008 lb/hr x 24 hr = 0.19 lb
Xylenes:	0.019 lb/hr x 24 hr = 0.46 lb
Total BTEX:	0.19 lb/hr x 24 hr = 4.56 lb

BTEX Removal During Pilot Test

Total BTEX: 4.56 lb

Assume Gasoline Mixture = 6.24 lbs/gallon

(4.56 lb) / (6.24 lbs/gallon) = **0.73 gallons**

Approximately 0.73 gallons of hydrocarbons were removed from the airstrean during the operation of the 24 hour pilot test

Vacuum Enhanced Pumping
Estimated Hydrocarbon Removal Rates

Groundwater Stream

Groundwater Flow Rate: 2.4 gpm

Groundwater Influent Concentrations:

Influent 1		Influent 2	
Benzene	15,000 ppb	Benzene	16,000 ppb
Toluene	1,900 ppb	Toluene	1,900 ppb
Ethylbenzene	4,900 ppb	Ethylbenzene	4,900 ppb
Xylenes	1,100 ppb	Xylenes	1,100 ppb
TOTAL	22,900 ppb		23,900 ppb

Average Influent Concentration: 23,400 ppb = 23.4 ppm or Mg/l

(23.4 Mg/l)(1 g/1000 mg)(28.5 L/1 ft^3)(1 ft^3/7.48 gal)(1 lb/454 g)(2.4 gal/1 min)(60 min/1 hr)

= 0.028 lb BTEX/hr

24 hour test:

(0.028 lb BTEX/hr) (24 hrs) = 0.679 lb BTEX Removed

Appendix C

Specific Capacity

and

Cone of Influence Calculations

Specific Capacity of Recovery Well(s) in the Low Conductivity Area
Interim Vacuum Design

The equation for specific capacity of a well from Walton, 1970 is:

$$\frac{Q}{s} = \frac{T}{264 \log \frac{(T*t)}{(2693 * r^2 * phi)} - 65.5}$$

Where:

Q = Pumping rate (gpm)
s = Drawdown in pumping well (ft)
T = Average Transmissivity (gpd/ft) = k*Th
k = hydraulic conductivity (ft/day)
Th = aquifer thickness (ft)
r = Radius of well (ft)
t = time (equilibrium) (minutes)
phi = Effective porosity

Variables:

k =	17
Th =	9
T =	157.00
r =	0.1667
t =	1260
phi =	0.005

$$\frac{Q}{s} = \textbf{0.04 gpm/ft}$$

Maximum drawdown in each recovery well = **8.50 ft**
Pumping rate for each recovery well = **0.363 gpm**

Vacuum Applied	=	10.0 inHg
	=	11.0 ft water additional effective drawdown will be generated attributed to the larger expected groundwater yield from a recovery well
Total Drawdown	=	**19.5 ft**
Pumping rate	=	**0.83 gpm**
No. of wells	=	1
Total Flow Rate	=	**0.83 gpm**

Specific Capacity of Recovery Well(s) in the High Conductivity Area
Interim Vacuum Design

The equation for specific capacity of a well from Walton, 1970 is:

$$\frac{Q}{s} = \frac{T}{264 \log \frac{(T*t)}{(2693 * r^2 * phi)} - 65.5}$$

Where:

Q = Pumping rate (gpm)
s = Drawdown in pumping well (ft)
T = Average Transmissivity (gpd/ft) = k*Th
k = hydraulic conductivity (ft/day)
Th = aquifer thickness (ft)
r = Radius of well (ft)
t = time (equilibrium) (minutes)
phi = Effective porosity

Variables:

k =	39
Th =	9
T =	351.00
r =	0.1667
t =	1260
phi =	0.005

$$\frac{Q}{s} = \textbf{0.1 gpm/ft}$$

Maximum drawdown in each recovery well = **8.50 ft**
Pumping rate for each recovery well = **0.762 gpm**

Vacuum Applied	=	10.0 inHg
	=	11.0 ft water additional effective drawdown will be generated attributed to the larger expected groundwater yield from a recovery well
Total Drawdown	=	**19.5 ft**
Pumping rate	=	**1.75 gpm**
No. of wells	=	1
Total Flow Rate	=	**1.75 gpm**

Cone of Influence of Recovery Well(s) Low Conductivity
Interim Design

The drawdown in a recovery well and vicinity can be defined by the Jacob-Cooper modification of the Theis equation as:

$$*s = \frac{264\,Q}{T} \log \frac{0.3\,T\,t}{r^2 * S}$$

Where:

s = Drawdown (ft)
Q = Pumping rate (gpm)
T = Coefficient of Transmissivity (gpd/ft) = k*Th
k = hydraulic conductivity (ft/day)
Th = aquifer thickness (ft)
S = Coefficient of Storage (dimensionless)
t = Time since pumping started (days)
r = Distance from center of pumping well to a point where the drawdown is measured (ft)

Variables:

Q =	0.83
k =	17
Th =	9
T =	1144.44
S =	0.01
t =	0.875
r =	75.0

***s = 0.17 ft**

The results of the distance-drawdown evaluation indicate that the proposed recovery wells are sufficient to establish the desired cone of influence. A drawdown of *s feet can theoretically be observed 75 feet from the recovery well.

*Freeze, Allen, and John Cherry. "Groundwater",Englewood Cliffs, New Jersey (1979)

Cone of Influence of Recovery Well(s) High Conductivity
Interim Design

The drawdown in a recovery well and vicinity can be defined by the Jacob-Cooper modification of the Theis equation as:

$$*s = \frac{264\,Q}{T} \log \frac{0.3\,T\,t}{r^2 * S}$$

Where:

s = Drawdown (ft)
Q = Pumping rate (gpm)
T = Coefficient of Transmissivity (gpd/ft) = k*Th
k = hydraulic conductivity (ft/day)
Th = aquifer thickness (ft)
S = Coefficient of Storage (dimensionless)
t = Time since pumping started (days)
r = Distance from center of pumping well to a point where the drawdown is measured (ft)

Variables:

Q =	1.75
k =	39
Th =	9
T =	2625.48
S =	0.01
t =	0.875
r =	75.0

***s = 0.22 ft**

The results of the distance-drawdown evaluation indicate that the proposed recovery wells are sufficient to establish the desired cone of influence. A drawdown of *s feet can theoretically be observed 75 feet from the recovery well.

*Freeze, Allen, and John Cherry. "Groundwater".Englewood Cliffs, New Jersey (1979)

Appendix D

Laboratory Analytical Results

and

Chain of Custody Records

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

IT Corporation
2790 Mosside Blvd
Monroeville, PA 15146-2792

Date: April 13, 1994

Attn: Tom Mathison

Project Number 563

This is the Certificate of Analysis for the following samples:

Client Project ID:	Questar Pipeline (Vernal Utah Rapid)
Date Received:	March 29, 1994
Work Order:	3953
Number of Samples:	2
Sample Type:	Air

I. Introduction

Two samples arrived at ITAS Cincinnati on March 29, 1994. The samples were collected on March 25, 1994 and were labeled as follows:

Client Sample ID	Lab Sample ID
AS-1	AD2020
AS-2	AD2021

II. Analytical Results/Methodology

The analytical results for this report are presented by analytical test. The data will include sample identification information, the analytical results, and the appropriate detection limits.

The analysis requested was Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry; EPA Method TO-14.

Reviewed and Approved by:

Joy Wallace

Joy Wallace, C.H.M.M.
Project Manager

IT ANALYTICAL SERVICES
CINCINNATI, OH
(513) 782-4600

III. Quality Control

Immediately following the analytical data for the samples can be found the QA/QC information that pertains to these samples. The purpose of this information is to demonstrate that the data enclosed is scientifically valid and defensible. This QA/QC data is used to assess the laboratory's performance during the analysis of the samples it accompanies. All quantitations were performed within the calibrated range of the analytical instrument.

IV. Data Report Qualifiers and Abbreviations

Following are descriptions of data report qualifiers which may have been used in this analytical report.

J Indicates an estimated value. This flag is used when mass spectral data indicates the presence of the compound, but the result is less than the specified detection limit.

B This flag is used whenever the analyte is found in the blank as well as in the sample.

E This flag indicates that the quantity of this compound detected in this sample is above the calibrated range of the instrument.

ND Not detected above the reported detection limit

Client: QUESTAR
Workorder: 3953

IT ANALYTICAL SERVICES
CINCINNATI, OH

TO-14 Volatile Organics

Client Sample ID: AS-1

Lab Sample ID: AD2020

Analysis Date: 04/05/94

Dilution Factor: 1963

CAS #	Compound	Result ppb(V/V)		Detection Limit
71-43-2	Benzene	310000	.E.....	390
108-88-3	Toluene	59000	.....	390
100-41-4	Ethylbenzene	ND	.....	390
IT5-30-5	m/p-Xylene	ND	.....	390
95-47-6	o-Xylene	ND	.....	390

Surrogate Compound	% Recovery
D4-1,2-Dichloroethane	90
D8-Toluene	104
Bromofluorobenzene	89

Client: QUESTAR
Workorder: 3953

IT ANALYTICAL SERVICES
CINCINNATI, OH

TO-14 Volatile Organics

Client Sample ID: AS-1

Lab Sample ID: AD2020 Dilution

Analysis Date: 04/08/94

Dilution Factor: 25961

CAS #	Compound	Result ppb(V/V)	Detection Limit
71-43-2	Benzene	430000	5200
108-88-3	Toluene	94000	5200
100-41-4	Ethylbenzene	19000	5200
IT5-30-5	m/p-Xylene	40000	5200
95-47-6	o-Xylene	7600	5200

Surrogate Compound	% Recovery
D4-1,2-Dichloroethane	96
D8-Toluene	105
Bromofluorobenzene	94

Client: QUESTAR
Workorder: 3953

IT ANALYTICAL SERVICES
CINCINNATI, OH

TO-14 Volatile Organics

Client Sample ID: AS-2

Lab Sample ID: AD2021

Analysis Date: 04/06/94

Dilution Factor: 2275

CAS #	Compound	Result ppb(V/V)		Detection Limit
71-43-2	Benzene	370000	.E	460
108-88-3	Toluene	91000		460
100-41-4	Ethylbenzene	730		460
IT5-30-5	m/p-Xylene	ND		460
95-47-6	o-Xylene	ND		460

Surrogate Compound	% Recovery
D4-1,2-Dichloroethane	90
D8-Toluene	103
Bromofluorobenzene	91

Client: QUESTAR
Workorder: 3953

IT ANALYTICAL SERVICES
CINCINNATI, OH

TO-14 Volatile Organics

Client Sample ID: AS-2

Lab Sample ID: AD2021 Dilution

Analysis Date: 04/08/94

Dilution Factor: 30292

CAS #	Compound	Result ppb(V/V)	Detection Limit
71-43-2	Benzene	450000	6100
108-88-3	Toluene	110000	6100
100-41-4	Ethylbenzene	20000	6100
IT5-30-5	m/p-Xylene	42000	6100
95-47-6	o-Xylene	7900	6100

Surrogate Compound	% Recovery
D4-1,2-Dichloroethane	95
D8-Toluene	105
Bromofluorobenzene	91

Client: QUESTAR
Workorder: 3953

IT ANALYTICAL SERVICES
CINCINNATI, OH
(513) 782-4600

TO-14 Volatile Organics

Client Sample ID: SYSTEM BLANK

Lab Sample ID: ABLKL5

Analysis Date: 04/05/94

Dilution Factor: 1

CAS #	Compound	Result ppb(V/V)	Detection Limit
71-43-2	Benzene	ND	0.20
108-88-3	Toluene	ND	0.20
100-41-4	Ethylbenzene	ND	0.20
IT5-30-5	m/p-Xylene	ND	0.20
95-47-6	o-Xylene	ND	0.20

Surrogate Compound	% Recovery
D4-1,2-Dichloroethane	102
D8-Toluene	103
Bromofluorobenzene	95

Client: QUESTAR
Workorder: 3953

IT ANALYTICAL SERVICES
CINCINNATI, OH
(513) 782-4600

TO-14 Volatile Organics

Client Sample ID: SYSTEM BLANK

Lab Sample ID: ABLKL7

Analysis Date: 04/07/94

Dilution Factor: 1

CAS #	Compound	Result ppb(V/V)	Detection Limit
71-43-2	Benzene	ND	0.20
108-88-3	Toluene	ND	0.20
100-41-4	Ethylbenzene	ND	0.20
IT5-30-5	m/p-Xylene	ND	0.20
95-47-6	o-Xylene	ND	0.20

Surrogate Compound	% Recovery
D4-1,2-Dichloroethane	98
D8-Toluene	103
Bromofluorobenzene	94

INTERNATIONAL TECHNOLOGY CORPORATION

WW 5405

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD*

Reference Document No. 401048
Page 1 of 1

Project Name/No.[1] 519063
Sample Team Members[2] Scott Dury
Profit Center No.[3] 3511
Project Manager[4] Tom Mathison
Purchase Order No.[6]
Required Report Date[11]

Samples Shipment Date[7] 3/25/94
Lab Destination[8] IT Cincinnati
Lab Contact[9] Jant
Project Contact/Phone[12] 412 372-7701
Carrier/Waybill No.[13]

Bill to:[5]

Report to:[10] Tom Mathison
IT Corporation
2790 Mosside Blvd.
Monroeville, PA 15146

ONE CONTAINER PER LINE

Sample Number[14]	Sample Description/Type[15]	Date/Time Collected[16]	Container Type[17]	Sample Volume[18]	Preservative[19]	Requested Testing Program[20]	Condition on Receipt[21]	Disposal Record No.[22]
AS-1	Air	3/25/94/3:3[illegible]	Vacuum Canister	2 Liter	—	BTEX TO-14	Sample Recd in Good Condition	
AS-2	Air	3/25/94/2[illegible]	↓	↓	—	BTEX TO-14	Good Condition	

Intact or Present

USE ONLY

Special Instructions:[23]

Possible Hazard Identification:[24]
Non-hazard ☑ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐

Sample Disposal:[25]
Return to Client ☐ Disposal by Lab ☑ Archive _____ (mos.)

Turnaround Time Required:[26]
Normal ☑ Rush ☐

QC Level:[27]
I. ☐ II. ☐ III. ☐ Project Specific (specify):

1. Relinquished by[28] (Signature/Affiliation) Steve Duncan	Date: 3/25/94 Time: 1500	1. Received by[28] (Signature/Affiliation) [illegible] FTASCA	Date: 3/28/94 Time: 0915
2. Relinquished by (Signature/Affiliation)	Date: Time:	2. Received by (Signature/Affiliation)	Date: Time:
3. Relinquished by (Signature/Affiliation)	Date: Time:	3. Received by (Signature/Affiliation)	Date: Time:

Comments:[29]

MCA 3/15/91

White to accompany samples. Yellow: Field copy. *See back of form for special instructions.

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

IT CORPORATION
2790 MOSSIDE BLVD.
MONROEVILLE, PA 15146-2792
TOM MATHISON

Date: 03/30/94

Work Order: B4-03-292 P.O. Number: 519063.002.03.001

This is the Certificate of Analysis for the following samples:

Client Work ID: QUESTAR PIPELINE - STRIPPER 519063-002-03-01
Date Received: 03/29/94
Number of Samples: 4
Sample Type: WATER

I. Introduction

Samples were labeled as follows:

SAMPLE IDENTIFICATION	LABORATORY #
1-INFLUENT	B4-03-292-01
1-EFFLUENT	B4-03-292-02
2-INFLUENT	B4-03-292-03
2-EFFLUENT	B4-03-292-04

Reviewed and Approved:

Jon Bartell
Laboratory Director

IT ANALYTICAL SERVICES
AUSTIN, TX
(512) 892-6684

Company: IT CORPORATION
Date: 03/30/94
Client Work ID: QUESTAR PIPELINE - STRIPPER 519063-002-03-01 Work Order: B4-03-292

II. QA/QC

The results presented in this report meet the statement of work requirements in accordance with Quality Control and Quality Assurance protocol except as noted in Section IV or in an optional sample narrative at the end of Section III.

In the presented analytical data, 'ND' or '<' indicates that the compound is not detected at the specified limit.

III. Analytical Data

The following page(s) supply results for requested analyses performed on the samples listed above.

The test results relate to tested items only. ITAS-Austin reserves the right to control report production except in whole.

IT ANALYTICAL SERVICES
AUSTIN, TX
(512) 892-6684

Company: IT CORPORATION
Date: 03/30/94
Client Work ID: QUESTAR PIPELINE - STRIPPER 519063-002-03-01 Work Order: B4-03-292

TEST NAME: Hazardous Substance Vols.
METHOD REFERENCE: EPA8240

SAMPLE ID: 1-INFLUENT
SAMPLE DATE: 03/25/94
SAMPLE MATRIX: WATER
ANALYSIS DATE: 03/29/94
UNITS: ug/L

	Result	Reporting Limit		Result	Reporting Limit
Methyl chloride	ND	1000	1,2-Dichloropropane	ND	500
Methyl bromide	ND	500	trans-1,3-Dichloropropene	ND	500
Vinyl chloride	ND	1000	Trichloroethylene	ND	500
Chloroethane	ND	1000	Chlorodibromomethane	ND	500
Methylene chloride	ND	1000	1,1,2-Trichloroethane	ND	500
Acetone	ND	10000	Benzene	15000	500
Carbon disulfide	ND	500	cis-1,3-Dichloropropene	ND	500
1,1-Dichloroethylene	ND	500	2-Chloroethylvinyl ether	ND	1000
1,1-Dichloroethane	ND	500	Bromoform	ND	500
trans-1,2-Dichloroethylene	ND	500	2-Hexanone	ND	5000
cis-1,2-Dichloroethylene	ND	500	4-Methyl-2-pentanone	ND	5000
Chloroform	ND	500	Tetrachloroethylene	ND	500
1,2-Dichloroethane	ND	500	1,1,2,2-Tetrachloroethane	ND	500
2-Butanone	ND	10000	Toluene	1900	500
1,1,1-Trichloroethane	ND	500	Chlorobenzene	ND	500
Carbon tetrachloride	ND	500	Ethylbenzene	490J	500
Vinyl acetate	ND	1000	Styrene	ND	500
Dichlorobromomethane	ND	500	Xylenes, total	1100	500

Surrogates	% Recovery
Toluene-D8	98
Bromofluorobenzene	97
1,2-Dichloroethane-D4	98

Referenced notes for these results:

J= Value reported is less than PQL.

IT ANALYTICAL SERVICES
AUSTIN, TX
(512) 892-6684

Company: IT CORPORATION
Date: 03/30/94
Client Work ID: QUESTAR PIPELINE - STRIPPER 519063-002-03-01 Work Order: B4-03-292

TEST NAME: Hazardous Substance Vols.
METHOD REFERENCE: EPA8240

SAMPLE ID: 1-EFFLUENT
SAMPLE DATE: 03/25/94
SAMPLE MATRIX: WATER
ANALYSIS DATE: 03/29/94
UNITS: ug/L

	Result	Reporting Limit		Result	Reporting Limit
Methyl chloride	ND	10	1,2-Dichloropropane	ND	5
Methyl bromide	ND	5	trans-1,3-Dichloropropene	ND	5
Vinyl chloride	ND	10	Trichloroethylene	ND	5
Chloroethane	ND	10	Chlorodibromomethane	ND	5
Methylene chloride	ND	10	1,1,2-Trichloroethane	ND	5
Acetone	ND	100	Benzene	42	5
Carbon disulfide	ND	5	cis-1,3-Dichloropropene	ND	5
1,1-Dichloroethylene	ND	5	2-Chloroethylvinyl ether	ND	10
1,1-Dichloroethane	ND	5	Bromoform	ND	5
trans-1,2-Dichloroethylene	ND	5	2-Hexanone	ND	50
cis-1,2-Dichloroethylene	ND	5	4-Methyl-2-pentanone	ND	50
Chloroform	ND	5	Tetrachloroethylene	ND	5
1,2-Dichloroethane	ND	5	1,1,2,2-Tetrachloroethane	ND	5
2-Butanone	ND	100	Toluene	5.6	5
1,1,1-Trichloroethane	ND	5	Chlorobenzene	ND	5
Carbon tetrachloride	ND	5	Ethylbenzene	ND	5
Vinyl acetate	ND	10	Styrene	ND	5
Dichlorobromomethane	ND	5	Xylenes, total	ND	5

Surrogates	% Recovery
Toluene-D8	100
Bromofluorobenzene	100
1,2-Dichloroethane-D4	97

IT ANALYTICAL SERVICES
AUSTIN, TX
(512) 892-6684

Company: IT CORPORATION
Date: 03/30/94
Client Work ID: QUESTAR PIPELINE - STRIPPER 519063-002-03-01 Work Order: B4-03-292

TEST NAME: Hazardous Substance Vols.
METHOD REFERENCE: EPA8240

SAMPLE ID: 2-INFLUENT
SAMPLE DATE: 03/25/94
SAMPLE MATRIX: WATER
ANALYSIS DATE: 03/29/94
FIRST ANALYSIS: 03/19/94
UNITS: ug/L

	Result	Reporting Limit		Result	Reporting Limit
Methyl chloride	ND	1000	1,2-Dichloropropane	ND	500
Methyl bromide	ND	500	trans-1,3-Dichloropropene	ND	500
Vinyl chloride	ND	1000	Trichloroethylene	ND	500
Chloroethane	ND	1000	Chlorodibromomethane	ND	500
Methylene chloride	ND	1000	1,1,2-Trichloroethane	ND	500
Acetone	ND	10000	Benzene	16000	500
Carbon disulfide	ND	500	cis-1,3-Dichloropropene	ND	500
1,1-Dichloroethylene	ND	500	2-Chloroethylvinyl ether	ND	1000
1,1-Dichloroethane	ND	500	Bromoform	ND	500
trans-1,2-Dichloroethylene	ND	500	2-Hexanone	ND	5000
cis-1,2-Dichloroethylene	ND	500	4-Methyl-2-pentanone	ND	5000
Chloroform	ND	500	Tetrachloroethylene	ND	500
1,2-Dichloroethane	ND	500	1,1,2,2-Tetrachloroethane	ND	500
2-Butanone	ND	10000	Toluene	1900	500
1,1,1-Trichloroethane	ND	500	Chlorobenzene	ND	500
Carbon tetrachloride	ND	500	Ethylbenzene	490J	500
Vinyl acetate	ND	1000	Styrene	ND	500
Dichlorobrommomethane	ND	500	Xylenes, total	1100	500

Surrogates	% Recovery
Toluene-D8	96
Bromofluorobenzene	99
1,2-Dichloroethane-D4	101

Referenced notes for these results:

J= Value reported is less than PQL.

IT ANALYTICAL SERVICES
AUSTIN, TX
(512) 892-6684

Company: IT CORPORATION
Date: 03/30/94
Client Work ID: QUESTAR PIPELINE - STRIPPER 519063-002-03-01 Work Order: B4-03-292

TEST NAME: Hazardous Substance Vols.
METHOD REFERENCE: EPA8240

SAMPLE ID: 2-EFFLUENT
SAMPLE DATE: 03/25/94
SAMPLE MATRIX: WATER
ANALYSIS DATE: 03/29/94
UNITS: ug/L

	Result	Reporting Limit		Result	Reporting Limit
Methyl chloride	ND	10	1,2-Dichloropropane	ND	5
Methyl bromide	ND	5	trans-1,3-Dichloropropene	ND	5
Vinyl chloride	ND	10	Trichloroethylene	ND	5
Chloroethane	ND	10	Chlorodibromomethane	ND	5
Methylene chloride	ND	10	1,1,2-Trichloroethane	ND	5
Acetone	ND	100	Benzene	19	5
Carbon disulfide	ND	5	cis-1,3-Dichloropropene	ND	5
1,1-Dichloroethylene	ND	5	2-Chloroethylvinyl ether	ND	10
1,1-Dichloroethane	ND	5	Bromoform	ND	5
trans-1,2-Dichloroethylene	ND	5	2-Hexanone	ND	50
cis-1,2-Dichloroethylene	ND	5	4-Methyl-2-pentanone	ND	50
Chloroform	ND	5	Tetrachloroethylene	ND	5
1,2-Dichloroethane	ND	5	1,1,2,2-Tetrachloroethane	ND	5
2-Butanone	ND	100	Toluene	ND	5
1,1,1-Trichloroethane	ND	5	Chlorobenzene	ND	5
Carbon tetrachloride	ND	5	Ethylbenzene	ND	5
Vinyl acetate	ND	10	Styrene	ND	5
Dichlorobromomethane	ND	5	Xylenes, total	ND	5

Surrogates	% Recovery
Toluene-D8	98
Bromofluorobenzene	98
1,2-Dichloroethane-D4	99

Company: IT CORPORATION
Date: 03/30/94
Client Work ID: QUESTAR PIPELINE - STRIPPER 519063-002-03-01 Work Order: B4-03-292

IT ANALYTICAL SERVICES
AUSTIN, TX
(512) 892-6684

IV. Methodology

Requested analyses were performed according to the following methods.

TEST NAME Hazardous Substance Vols. TEST CODE 8240

Hazardous Substance List Volatiles	Method 8240, SW-846, Test Methods for Evaluating Solid wastes, Third Edition. GC/MS Purge and Trap analysis.

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD*

B403292

Reference Document No. 416953

Page 1 of ___

Project Name/No. [1] 519063

Sample Team Members [2] Scott Dury

Profit Center No. [3] 3511

Project Manager [4] Tom Mathison

Purchase Order No. [6]

Required Report Date [11]

Samples Shipment Date [7] 3/25/94

Lab Destination [8] IT Austin

Lab Contact [9] Carla

Project Contact/Phone [12] 412 372-7701

Carrier/Waybill No. [13] fedex 901566377 5 Th 3/29/94

Bill to: [5]

Report to: [10] Tom Mathison
IT Corp.
2790 Mosside Blvd
Monroeville PA 15146

ONE CONTAINER PER LINE

Sample [14] Number	Sample [15] Description/Type	Date/Time [16] Collected	Container [17] Type	Sample [18] Volume	Pre- [19] servative	Requested Testing [20] Program	Condition on [21] Receipt	Disposal [22] Record No.
1-Influent	water	3/25/94/2:45	40 ml	40 ml	HCL	EPA 8240	Good 1°C	Lot # B327000
1-Influent		3/25/94/2:45					See RUR's	
1-Effluent		3/25/94/2:50					Th 3/29/94	
1-Effluent		3/25/94/2:50						
2-Influent		3/25/94/2:35						
2-Influent		3/25/94/2:40						
2-Effluent		3/25/94/2:35						
2-Effluent		3/25/94/2:30						

Special Instructions: [23]

Possible Hazard Identification: [24]
Non-hazard ☑ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐

Sample Disposal: [25]
Return to Client ☐ Disposal by Lab ☑ Archive (mos.)

Turnaround Time Required: [26]
Normal ☐ Rush ☑ 24 Hour Turnaround

QC Level: [27]
I. ☐ II. ☐ III. ☐ Project Specific (specify):

1. Relinquished by [28] (Signature/Affiliation) Steve Dunien	Date: 3/25/94 Time: 1500
1. Received by [28] (Signature/Affiliation) IT	Date: 3/29/94 Time: 0946
2. Relinquished by (Signature/Affiliation)	Date: Time:
2. Received by (Signature/Affiliation)	Date: Time:
3. Relinquished by (Signature/Affiliation)	Date: Time:
3. Received by (Signature/Affiliation)	Date: Time:

Comments: [29]

MCA 3/15/91

White: To accompany samples Yellow: Field copy

*See back of form for special instructions

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

IT CORPORATION
2790 MOSSIDE BLVD.
MONROEVILLE, PA 15146-2792
TOM MATHISON

Date: 04/07/94

Work Order: B4-04-043 P.O. Number: 519603.002.03.001

This is the Certificate of Analysis for the following samples:

Client Work ID: NAP 65 TRUCK STOP 519063-002-03-01
Date Received: 04/06/9
Number of Samples: 1
Sample Type: WATER

I. Introduction

Samples were labeled as follows:

SAMPLE IDENTIFICATION	LABORATORY #
3-EFFLUENT	B4-04-043-01

Reviewed and Approved:

Jon Bartell
Laboratory Director

Company: IT CORPORATION
Date: 04/07/94
Client Work ID: NAP 65 TRUCK STOP **519063-002-03-01 Work Order: B4-04-043**

II. QA/QC

The results presented in this report meet the statement of work requirements in accordance with Quality Control and Quality Assurance protocol except as noted in Section IV or in an optional sample narrative at the end of Section III.

In the presented analytical data, 'ND' or '<' indicates that the compound is not detected at the specified limit.

III. Analytical Data

The following page(s) supply results for requested analyses performed on the samples listed above.

The test results relate to tested items only. ITAS-Austin reserves the right to control report production except in whole.

Company: IT CORPORATION
Date: 04/07/94
Client Work ID: NAP 65 TRUCK STOP 519063-002-03-01 Work Order: B4-04-043

TEST NAME: Hazardous Substance Volc
METHOD REFERENCE: EPA8240

SAMPLE ID: 3-EFFLUENT
SAMPLE DATE: 04/05/94
SAMPLE MATRIX: WATER
ANALYSIS DATE: 04/06/94
UNITS: ug/L

	Result	Reporting Limit		Result	Reporting Limit
Methyl chloride	ND		1,2-Dichloropropane	ND	5
Methyl bromide	ND		trans-1,3-Dichloropropene	ND	5
Vinyl chloride	ND		Trichloroethylene	ND	5
Chloroethane	ND		Chlorodibromomethane	ND	5
Methylene chloride	ND		1,1,2-Trichloroethane	ND	5
Acetone	ND		Benzene	ND	5
Carbon disulfide	ND		cis-1,3-Dichloropropene	ND	5
1,1-Dichloroethylene	ND		2-Chloroethylvinyl ether	ND	10
1,1-Dichloroethane	ND		Bromoform	ND	5
trans-1,2-Dichloroethylene	ND		2-Hexanone	ND	50
cis-1,2-Dichloroethylene	ND		4-Methyl-2-pentanone	ND	50
Chloroform	ND		Tetrachloroethylene	ND	5
1,2-Dichloroethane	ND		1,1,2,2-Tetrachloroethane	ND	5
2-Butanone	ND		Toluene	ND	5
1,1,1-Trichloroethane	ND		Chlorobenzene	ND	5
Carbon tetrachloride	ND		Ethylbenzene	ND	5
Vinyl acetate	ND		Styrene	ND	5
Dichlorobromomethane	ND		Xylenes, total	ND	5

Surrogates	% Recovery
Toluene-D8	101
Bromofluorobenzene	98
1,2-Dichloroethane-D4	101

Company: IT CORPORATION
Date: 04/07/94
Client Work ID: NAP 65 TRUCK STOP **519063-002-03-01 Work Order: B4-04-043**

IV. Methodology

Requested analyses were performed acc ding to the following methods.

TEST NAME **Hazardous Substance** Volm. EST CODE **8240**

Hazardous Substance List Volatiles	Method 824(SW-846, Test Methods for Evaluating Solid Wastes, Thi d Edition. **GC/MS Purge and Trap analysis.**	

B404043

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD*

Reference Document No. 416924
Page 1 of 1

Project Name/No. [1] WASTE TECH STAT/SCOPE 02.03 001 | Samples Shipment Date [7] 4/5/94 | Bill to: [5] IT - PITT, Tom MATHISON

Sample Team Members [2] D. Cobb | Lab Destination [8] AUSTIN ITAS

Profit Center No. [3] 3511 | Lab Contact [9] CARLA B.

Project Manager [4] Tom MATHISON | Project Contact/Phone [12] Tom Mathison/800 444 [illegible] | Report to: [10] SAME AS ABOVE

Purchase Order No. [6] | Carrier/Waybill No. [13] UPS 0334 9213 7

Required Report Date [11] 48hr 4/8/94

ONE CONTAINER PER LINE

Sample Number [14]	Sample Description/Type [15]	Date/Time Collected [16]	Container Type [17]	Sample Volume [18]	Preservative [19]	Requested Testing Program [20]	Condition on Receipt [21]	Disposal Record No. [22]
3-EFFLUENT	GW	4/5/94 1435	VOA Glass	2x40ml	HCL	BTEX / 8240	Good 4°C 4/6/94	

Special Instructions: [23] 48 hr TURN AROUND

Possible Hazard Identification: [24] Non-hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☒

Sample Disposal: [25] Return to Client ☐ Disposal by Lab ☒ Archive (mos.)

Turnaround Time Required: [26] Normal ☐ Rush ☒

QC Level: [27] I. ☐ II. ☐ III. ☐ Project Specific (specify):

1. Relinquished by [28] (Signature/Affiliation) Dan Cobb	Date: 4/5/94 Time: 15:00	1. Received by [29] (Signature/Affiliation) IT	Date: 4/6/94 Time: 1000
2. Relinquished by (Signature/Affiliation)	Date: Time:	2. Received by (Signature/Affiliation)	Date: Time:
3. Relinquished by (Signature/Affiliation)	Date: Time:	3. Received by (Signature/Affiliation)	Date: Time:

Comments: [29]

MKA 3/15/91

White: To accompany samples
Yellow: Field copy
See back of form for special instructions.

1412373135:# 6/ 8
4- 8-94 IT CORP/PROJECT MGT.
SENT BY:

ITAS_Austin Volatiles QA Spike Lot Summary LOT#: _____

Date/Time: 3/28/94 Intrument: EI

Operator: JMS Test/Matrix: 8240/water

GC Column: RTX 502.2 Operator: JMS

Type	Lab Sample ID	Lab File ID	Performed (Y or N)
Sample	B403263-05	F2635	
MS	-05MS	M635	
MSD	-05MSD	D635	
LCS	-BS	BT28	

This QA Spike Lot applies to the following Samples:

#	Client * Sample ID	Lab Sample ID	Lab File ID
01		B403263-05	
02		-01	
03		-02	
04		-08	
05		-10	
06		-12	
07		-13	
08		-15	
09		-16	
10		-03	
11		-07	
12		-04	
13		-06	
14		-09	
15		-11	
16		-14	
17		-17	
18		B404143-01	
19			
20			

Comments: _____

* - Field used only if necessar .

QC Batch ID

Prep Code/Date: _____/_____

Test Code/Date: 8240/3/28/94

Set #: 1 Inst. ID: E

WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY AND BLANK SPIKE RECOVERY

Lab Name: ITAS - Austin Date Ran: 3/28/94 QC BATCH ID
Sample Names: >EM635 >ED635 >EBT28 Prep Code/Date:
CLIENT ID: Test Code/Date: 8240 3/28/94
Matrix Spike - SAM Sample No. B403263/05 Matrix: WATER Set #: 0 Inst.ID: E1
(5.000 ML TO 5 ML) 1.0 DIL

COMPOUND NAME	SPIKE ADDED (ug/L)	SAMPLE CONC (ug/L)	MS CONC (ug/L)	MS % REC #	QC LIMITS REC.
1,1-Dichloroethene	50.00	.00	40.58	81	61 - 145
Trichloroethene	50.00	.00	43.72	87	71 - 120
Benzene	50.00	.00	46.67	93	76 - 127
Toluene	50.00	.00	47.87	96	76 - 125
Chlorobenzene	50.00	.00	48.76	98	75 - 130

BLANK CONC (ug/L)	BS CONC (ug/L)	BS % REC #	QC LIMITS REC.
0	8.13	81	61 - 145
0	8.51	85	71 - 120
0	9.24	92	76 - 127
0	9.47	95	76 - 125
0	9.44	94	75 - 130

COMPOUND NAME	SPIKE ADDED (ug/L)	MSD CONC. (ug/L)	MSD % REC #	RPD #	QC LIMITS RPD	QC LIMITS REC.
1,1-Dichloroethene	50.00	42.28	85	4	14	61 - 145
Trichloroethene	50.00	44.17	88	1	14	71 - 120
Benzene	50.00	46.06	92	1	11	76 - 127
Toluene	50.00	47.91	96	0	13	76 - 125
Chlorobenzene	50.00	47.48	95	3	13	75 - 130

Coluan to be used to flag recovery and RPD values with an asterisk.

* Values outside of QC limits.

RPD: 0 out of 5 outside limits.
Spike Recovery: 0 out of 10 outside limits.

0247 0023 0024

SURROGATE RECOVERIES	>EM635	>ED635	>EBT28	LIMITS
Toluene - d8	98	99	100	88 - 110
Bromofluorobenzene	99	100	99	86 - 115
1,2-Dichloroethane - d4	98	100	100	76 - 114

Blank
22:37
>EBL28
100
103
95
} all neg

FORM III VOA-2

APPENDIX N
SUBMITTAL REGISTER

SUBMITTAL REGISTER
NAPLES TRUCK STOP, ABOVEGROUND STORAGE TANK
UNLEADED GASOLINE RELEASE
RAPID RESPONSE PROJECT, ITC #88-94

All Documents Overnight Mail unless Otherwise Noted										
Name/Address	Draft Project Work Plans	Final Project Work Plans	Draft Cost Proposal	Final Cost Proposal	Verbal Covers. Record	Weekly Status Report	Daily Submit.	Draft Project Report	Final Project Report	HWM,WPS, LDRNC, CAT 1 Submit.
U.S. Army Corps of Engineers ATTN: CEMRO-ED-ER (Leahy) 215 N 17th Street Omaha, Nebraska 68102-4978 (402) 221-7770; FAX: ext. 7793	5	5	0	0	1	1	0	5	5	1
U.S. Army Corps of Engineers ATTN: CEMRO-CD-FC (Schmidt) Building 527 Fairchild Hall - 3rd Floor Offutt AFB, NE 68113 (402) 291-4260; FAX: ext. 8177	2	2	0	0	1	1	2	2	2	2
U.S. Army Corps of Engineers ATTN: CEMRO-CT-C (Witcofski) 215 N 17th Street Omaha, Nebraska 68102-4978 (402) 221-4113	0	0	7	7	0	0	0	0	0	0
U. S. Army Corps of Engineers ATTN: CEMRO-ED-EH (Bev Graham) 215 N 17th Street Omaha, Nebraska 68102-4978 (402) 221-7687	0	0	0	0	0	0	0	0	0	1
US Environmental Protection Agency, Region VIII ATTN: H. Hays Griswold 999 18th Street, Ste 500 Denver, CO. 80202-2405 (319) 753-7701	2	5	0	0	0	1	0	2	5	0

INTERNATIONAL TECHNOLOGY CORPORATION

July 27, 1994

Project No. 519063

U.S. Army Corps of Engineers
Attn: CEMRO-ED-ER (Leahy)
215 N. 17th Street
Omaha, NE 68102-4978

Naples Truck Stop Gasoline Spill
Naples, Utah
Contract DACW45-90-D-9002
Delivery Order No. 88

Dear Mr. Leahy:

IT Corporation (IT) is pleased to submit five (5) copies of the Draft Work Plan, Contractor Sampling and Analysis Plan (CSAP), and Site Safety and Health Plan (SSHP) for the Naples Truck Stop project, Contract No. DACW45-90-D-9002 and Delivery Order No. 88.

Should you have any questions concerning this submittal, please contact me at (412) 858-3987.

Respectfully submitted,

IT CORPORATION

Thomas P. Mathison
Project Manager

TPM:gjt
Enclosures

cc: S. Schmidt, USACE (2 copies)
A. Meyers, IT (1 copy)
H. Griswold, U.S. EPA (2 copies)